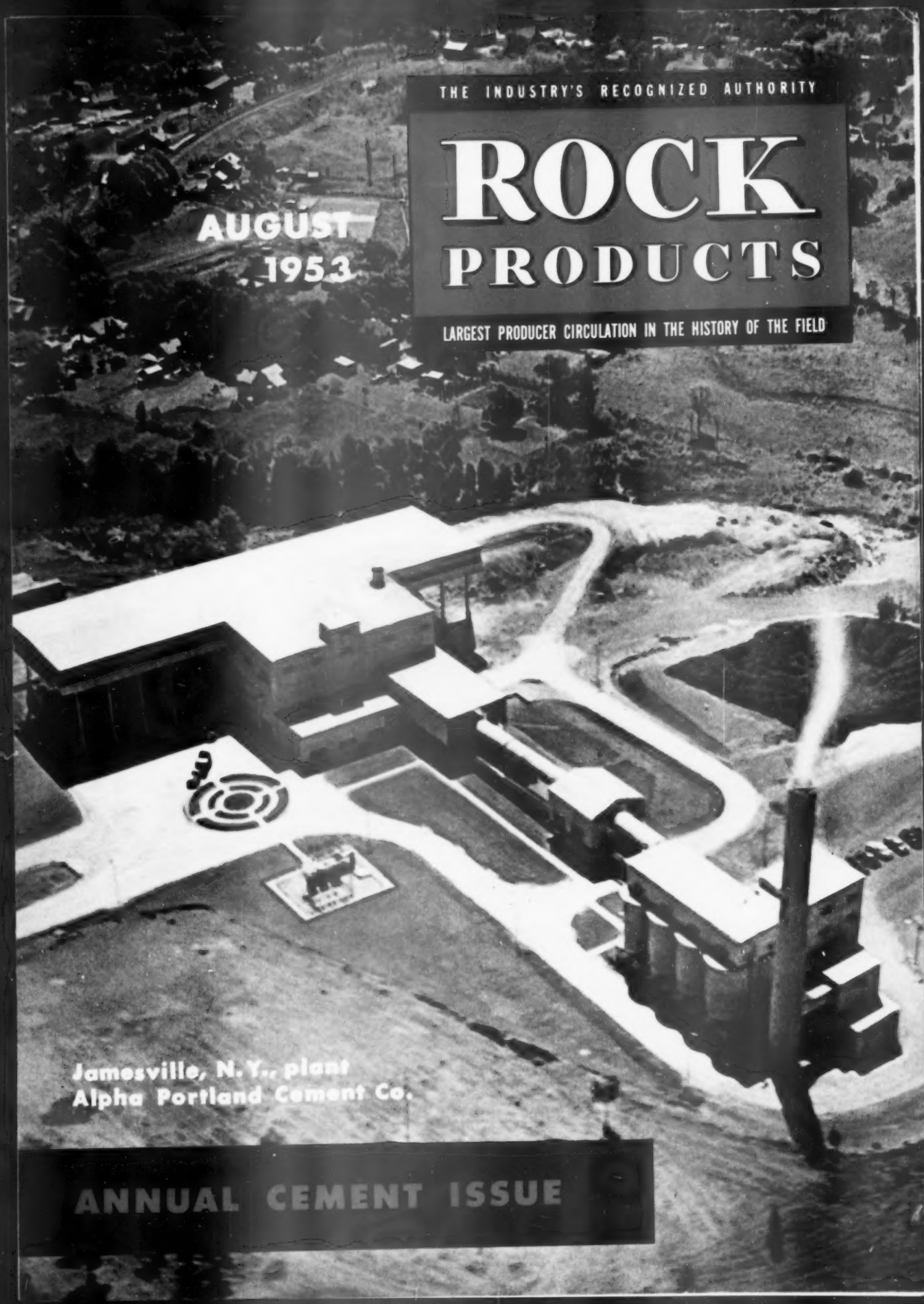
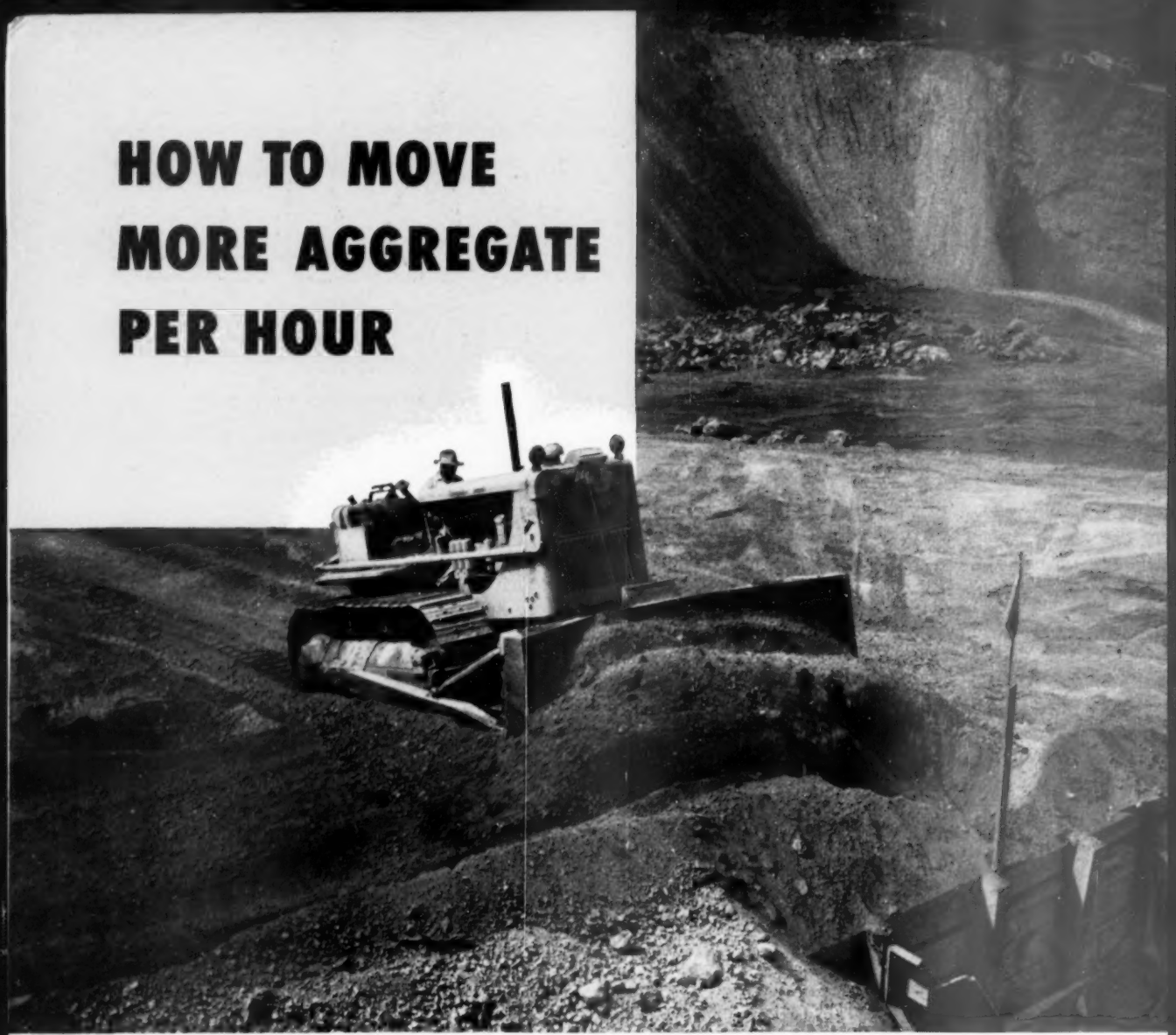

THE INDUSTRY'S RECOGNIZED AUTHORITY
ROCK PRODUCTS
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD
AUGUST 1953
Jamesville, N. Y., plant
Alpha Portland Cement Co.
ANNUAL CEMENT ISSUE

HOW TO MOVE MORE AGGREGATE PER HOUR



One of two Cat D8 Tractors-No. 8U Bulldozers owned by Skyline Materials, Inc., is shown moving aggregate to the hopper. Production at this quarry is 4,000 tons daily.

Every quarryman knows the big work power of a Cat* D8 Tractor. When you put a Caterpillar No. 8U Bulldozer on the front end of that husky machine you add to its capacity—make it possible to move more material in faster time.

Some owners claim the 8U *doubles* work output. Others are more conservative. But all agree they can move bigger blade loads farther, with less spillage, than with any other 'dozer.

Like all Caterpillar blades, the No. 8U is built ruggedly for extra-heavy duty. High carbon steel is used in the cutting edge for toughness and abrasion resistance. Box section reinforcements add strength and rigidity where needed. And the forward reach of the wings is scientifically designed to hold loose material in the load without side-spilling. Caterpillar Cable Controls give positive blade action and trouble-free performance.

If you want *proof* of what the No. 8U Bulldozer can do for you, ask your Caterpillar Dealer for an on-the-job demonstration. Every machine he sells is backed by prompt service and genuine parts. Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

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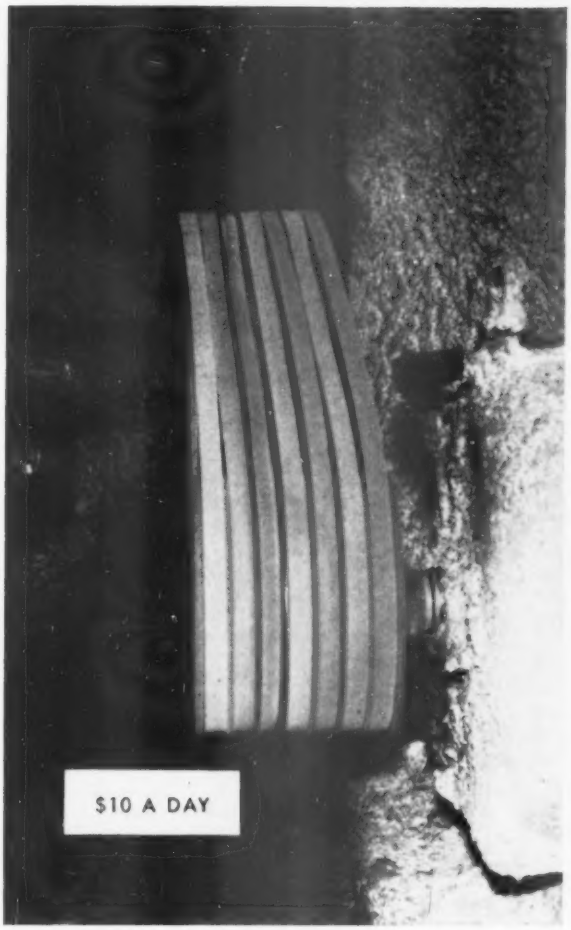
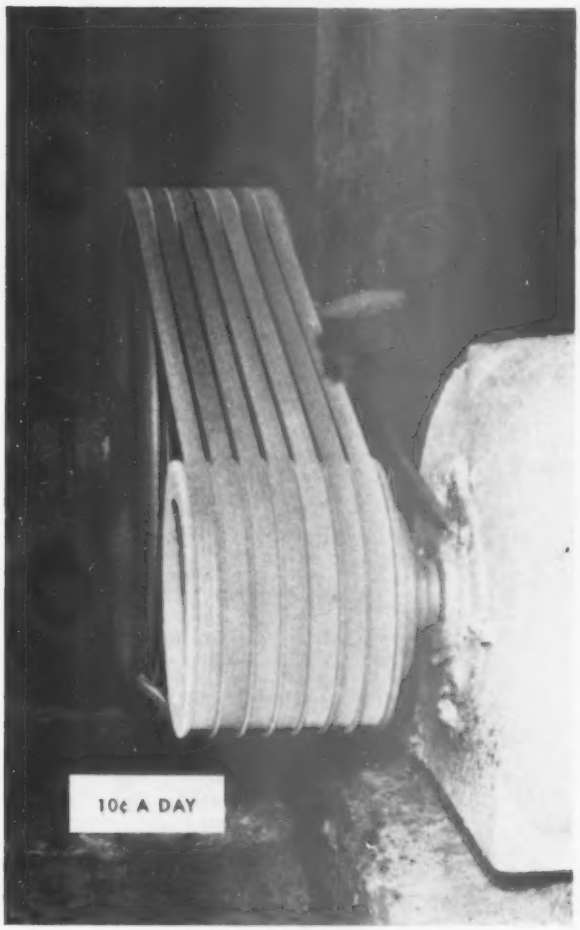
NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER





How these B. F. Goodrich belts cut costs from $10 a day to 10¢

A typical example of B. F. Goodrich improvement in rubber

THOSE pictures are of identical drives in the same plant. At left are ordinary V belts. Tension made them stretch out of shape so fast that $75 of belts only lasted 7 days—over $10 a day.

Then B. F. Goodrich grommet belts were tried. They lasted not 7 days but more than two years! B. F. Goodrich had tumbled belt costs from $10 a day to 10¢!

A grommet is a cord loop inside the belt. It is made like a giant twisted cable except that it's endless—no splices or overlaps. Grommet belts are more flexible, don't slip or stretch as much as ordinary belts. No other kind of belt has grommets; no other belt stands so much punishment or lasts so long.

Outlasting other rubber by many times is nothing unusual for products improved by B. F. Goodrich research. The cord conveyor belt which can last 10 times longer is typical of this. And the Burstproof steam hose that protects workers from scalding and injury makes a saving in safety as well as money. To find out more about these money-saving improvements and what they can do for you, send the coupon now for free facts on those rubber products you use.

The B. F. Goodrich Company
Dept. M-55, Akron 18, Ohio
I want to know more about the products I've checked below:
☐ Grommet V belts ☐ Cord conveyor belt
☐ Burstproof steam hose
☐ Other rubber products (name types) _____
☐ Send information by mail.
☐ Have a BFG distributor see me.
Name _____
Company _____
Address _____

Grommet V-Belts BY
B.F.Goodrich

ROCK PRODUCTS

AUGUST, 1953 — THE INDUSTRY'S RECOGNIZED AUTHORITY — VOL. 56, No. 8

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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DOUBLE DUTY

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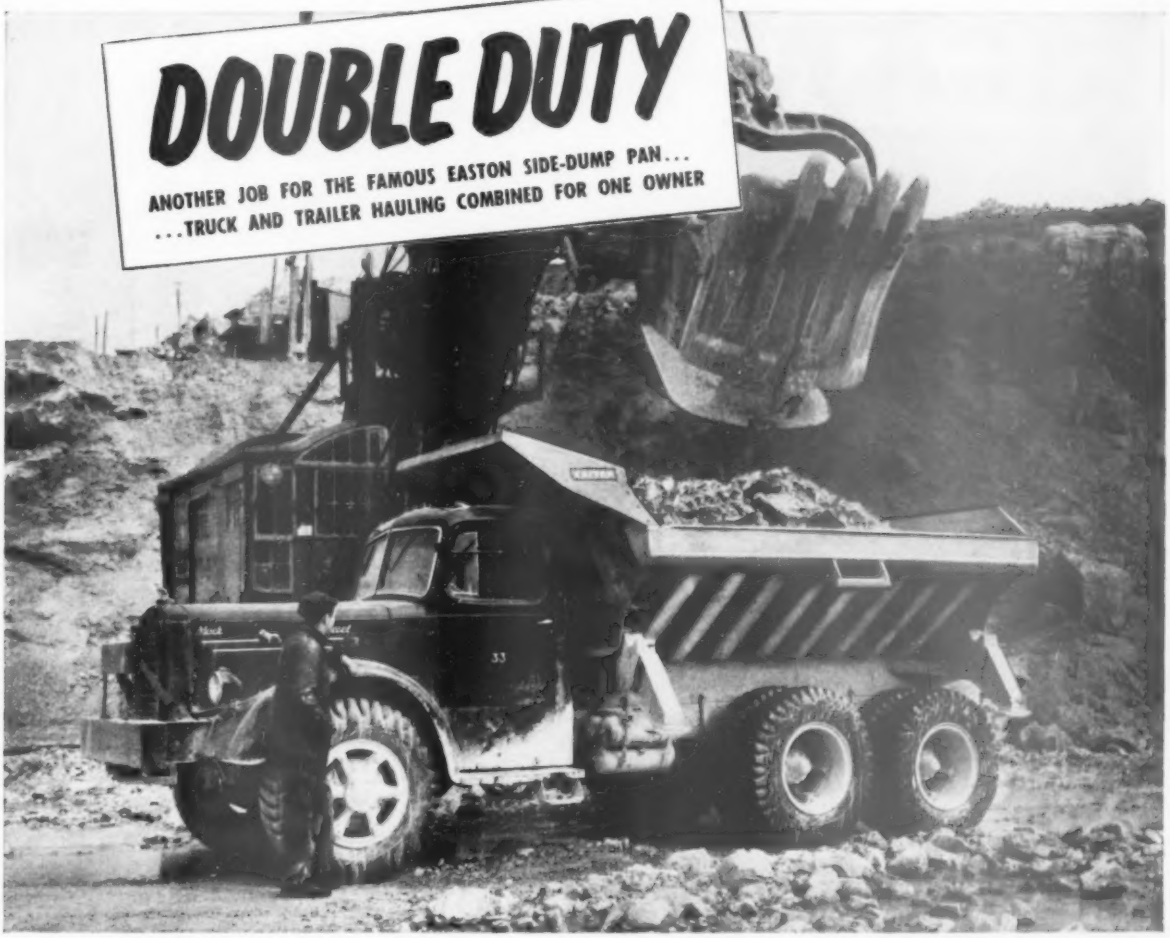
...TRUCK AND TRAILER HAULING COMBINED FOR ONE OWNER



▲ **HERE'S PLENTY OF GO** for any grade — 15 tons in an EASTON BP pan type body mounted on a six-wheel chassis

but only a side-dump can do this

▼ **DOUBLE THE PAYLOAD** — the dump body teamed with an EASTON TP trailer for another haul on the same property

YOU GET LOWEST COST PER TON when your haulage system is custom-fitted to your property. Fortunately, a qualified EASTON haulage survey costs you nothing. Why not take advantage of EASTON's broad experience? Write today.

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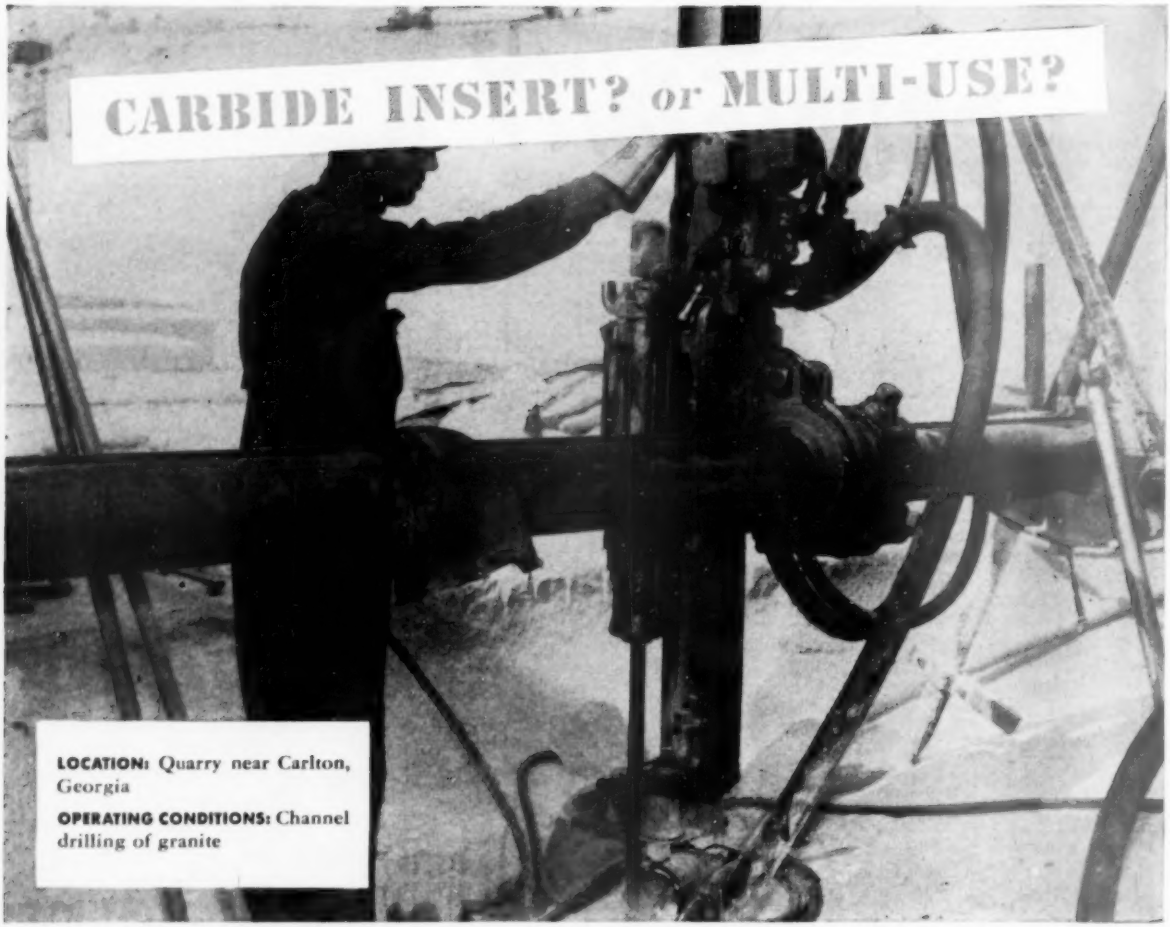


Dixie Granite Co. gets 200 more feet of hole per bit with TIMKEN® carbide insert bits!

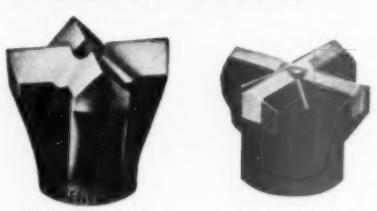
DIXIE Granite Company has standardized on Timken® carbide insert bits in channel drilling of granite for these four reasons: Timken carbide insert bits average 200 feet more hole per bit than other makes of forged bits! 50% increase in drilling speed! 25% lower cost per foot of hole! 25% production increase with fewer drills.

Through hard and abrasive ground, Timken carbide insert bits are the most economical. And they're your best bet for constant-gage holes, small diameter blast holes and very deep holes.

But for ordinary ground, use Timken multi-use bits. With correct and controlled reconditioning, they'll give you the lowest cost per foot of hole when full increments of steel can be drilled.

The combination of Timken carbide insert and multi-use bits will solve all your requirements. Because both are interchangeable in each thread series, you can switch bits as the ground changes—right on the job. As many as 93 different Timken bits fit the same threaded drill steel. And both Timken carbide insert and multi-use bits are made from electric furnace Timken fine alloy steel, have the shoulder union that protects threads from drilling impact, are quickly and easily changed.

To get the best bits for your job, call on the Timken Rock Bit Engineering Service. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

your best bet for the best bit . . . for every job

TIMKEN

Meeting the ROCK TEST

ROCK is this company's business. Here's a job that would test the mettle of any equipment. Greater crowding force, smoothness of dipper control, easier operation, accuracy of spotting, are just a few of the advantages that Northwest equipment brings you. They are advantages that show up in all hard rock work. Northwests are serving on some of the largest quarrying operations in the country. In many cases their speed is outproducing larger, slower equipment and their simplicity of design and dependable construction eliminates the constant irritation of minor adjustments and breakdowns that increase down time and reduce output.

The Northwest is a *real* Rock Shovel and if you have a *real* Rock Shovel you are equipped for any pit problem. Why not plan to have a Northwest? Talk it over with a Northwest Man.

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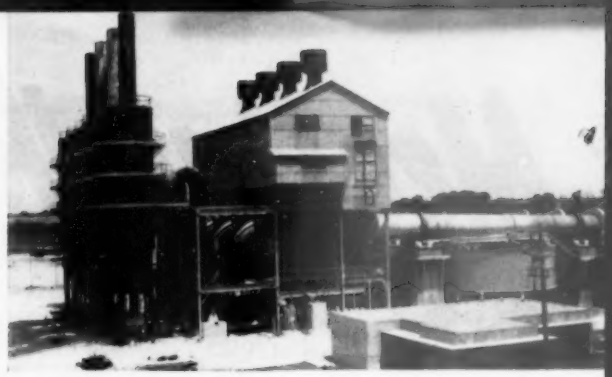
Traylor



Baton Rouge, La. - 3 of 4 9'6" x 250'0" Traylor Kilns installed in the plant of a leading Cement Producer.

HAS BUILT 40 Rotary Kilns DURING THE PAST 2 YEARS

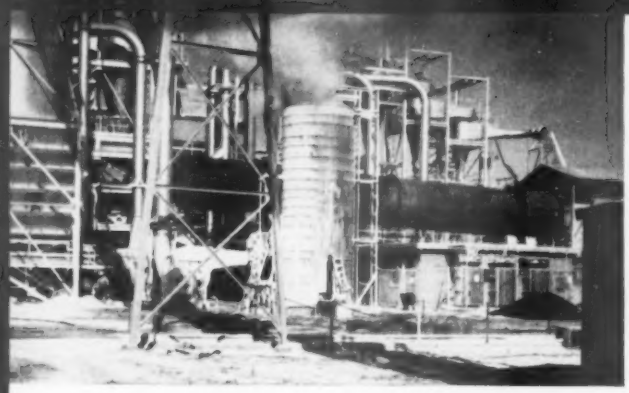
Covington, Va. - 11'0" x 350'0" Lime Kiln purchased by another leading paper maker for lime sludge recovery.

Palatka, Fla. - 7'0" x 200'0" Kiln in the plant of a paper manufacturer, used for lime sludge recovery.

Each Kiln individually "Traylored" for the efficient production of one of the following 13 different products.

Lime • Titanium Oxide • Bauxite • Cement • Sodium Silicate Dolomite • Iron Sulphide • Alumina • Sinter-Alumina • Calcium Chromate • Phosphate Rock • Lime Sludge • Diatomaceous Earth

A rotary kiln represents an important investment for any company. Leading producers all over the world have come to rely on Traylor's past experience to avoid future production headaches. Play it safe. Depend on the proven ability of Traylor engineers to assure the production you anticipate when expanding or modernizing your plant facilities.

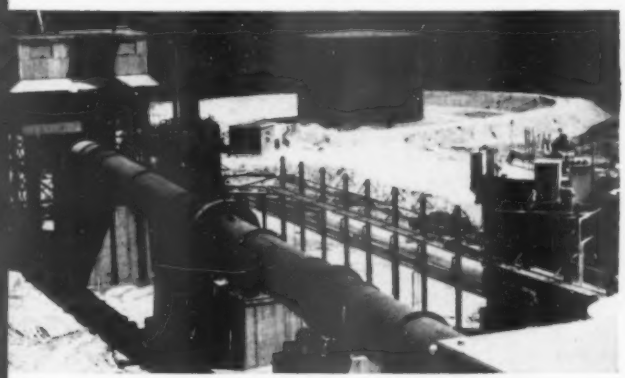


Lompoc, Calif. - An 11'0" x 100'0" Kiln producing Diatomaceous Earth.

Jamaica, B.W.I. - 9'0" x 175'0" Traylor Kiln used in the processing of Bauxite.

Acme, N.C. - Traylor 8'6" x 215'0" Lime Sludge Recovery Kiln in plant of well known paper manufacturer.

Chile, S.A. - 7'6" x 315'0" for calcining lime, used in the processing of copper ore.



ranging in size from 7' diameter up to 11' diameter x 400' long

Gardanne, France - 9'6" x 250'0" Rotary Kiln installed in the modern alumina plant of a well known overseas company.

Suriname, S.A. - Two of many Traylor Kilns installed in Latin America, these 8'0" x 120'0" kilns will be used in the production of Alumina.

A **Traylor** *Leads to Greater Profits*

York, Pa. - It took 7 flat cars to ship this 10' x 300', 3 section Traylor Kiln to this leading Dolomite producer.

Soon to be released! A new, fully illustrated, bulletin on Traylor Rotary Kilns is now in preparation. It will show the many superior features of Traylor Rotary Kiln design in detail. Mail the coupon today to be sure of getting up-to-date information you can't afford to miss.

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Company: _____

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They've got the "GO AHEAD" for big yardage

That's the word on high-speed, high-capacity Cat* DW20s from Superintendent Bill Wagner, Central Construction Co., Indianola, Iowa. He's not guessing—he knows. These 225 HP units are working for him on a 225,000 cu. yd. operation in the Concrete & Materials Construction Co. quarry at Legrand, Iowa.

Here are some typical production figures from this project. Loading time for three DW20-No. 20 Tractor-Scrapers with a push tractor in loose, sandy silt averaged about 40 seconds—unloading time, 10 seconds on the run. Output for the trio totaled about 6,000 cu. yd. per 11½ hour day. Bill Wagner says: "These DW20s are strictly go-ahead working machines—they go ahead right over spongy stuff easily. They're very handy to service. It's the best unit in the world."

That's saying a lot, but DW20s are *proving* it on jobs all over the country. Here are a few of their many features: travel speed—20 m.p.h. with the power and traction to haul a 20 cu. yd. heaped capacity up grades handily. Cable-controlled operation for "live" loading and fast unloading of any material. Three-point suspension that keeps all four wheels on the ground over the bumps. Big tires for flotation. Safety devices that give operators the confidence to work at top speed. All these and other advantages add up to *fast* cycle times!

Get the whole picture of these big-capacity Cats from your Caterpillar Dealer. He backs them with genuine parts and on-the-spot service that hold down time to the minimum and add to long life. Ask him to demonstrate on your job!

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

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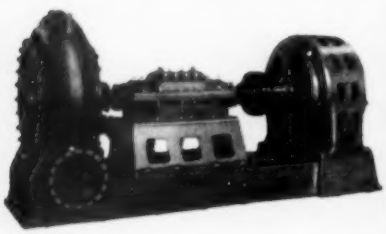
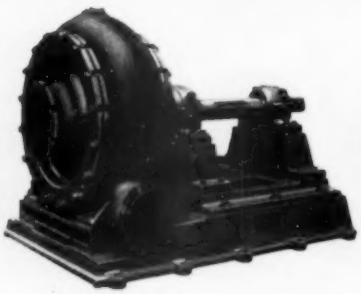
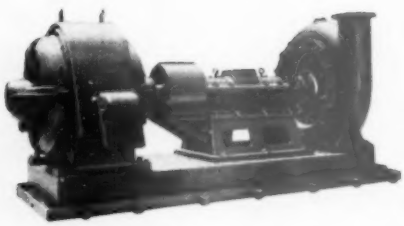
AMSCO PUMPS GIVE LOW-COST HANDLING OF MATERIALS



16-INCH, TYPE XH. Directly connected design; right hand, bottom discharge; water-cooled marine-type combination radial thrust bearing; ring oiling; sleeve-type outboard bearing. Can be fitted with "standard" or "counterflow" water ends.



6-INCH, TYPE SB-CF, FORM 24. Roller bearing; stub base or belt driven; right hand bottom discharge.



10-INCH, TYPE M. Left hand, top discharge. Built in 6-, 8-, and 10-inch sizes. Can be fitted with "standard" or "counterflow" water ends.

AND AMSCO PUMP PARTS AND FITTINGS SAVE IN MAINTENANCE COSTS

Hose nipple

90° Elbow

Bulkhead fitting

45° long radius elbow

Straight

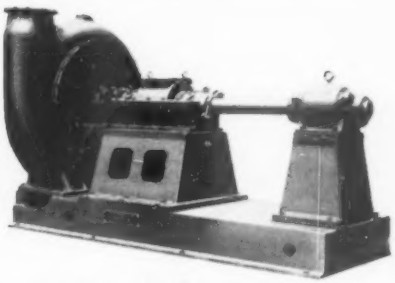
Elbow

AMERICAN Brake Shoe COMPANY

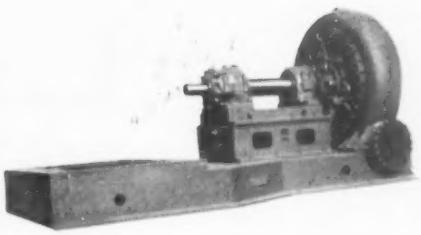
AMERICAN

Made of tough, long-lasting Manganese Steel, Amsco Dredge and Materials Handling Pumps are engineered for efficient operation

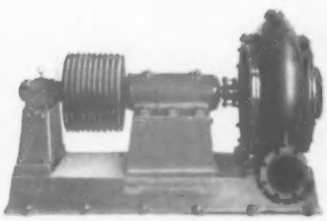
The Amsco Pumps pictured here represent our six basic models; actually there are 40 different models. The differences in each are in rated capacity, weight and construction of the bearings, and proportionate shaft sizes. Such modifications are made for economy in line with the services intended. With all wearing parts made of Amsco Manganese Steel, you get the economy of a work-hardening metal that resists impact and abrasion. This is why it is called "the toughest steel known"... and why Amsco Pumps have given as long as 40 years service. And why Amsco is a byword in the dredging industry.



12-INCH, TYPE H-CF, FORM 40. Right hand, top vertical discharge; belt driven. Combination two directional-type ball thrust bearing and sleeve-type radial bearings.



20-INCH, TYPE XHRB-CF. Left hand, bottom discharge. Antifriction thrust and radial bearings.



8-INCH, TYPE C, FORM 30. Belt driven, standard fitted pump. Left hand bottom discharge; combination ball thrust and ring oiling sleeve main bearings. Can be fitted with "standard" or "counterflow" water ends.

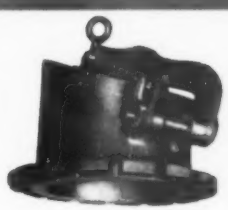
Amsco complementary pumping equipment and pump parts are also made of Manganese Steel for economical service

Amsco pipeline fittings are built to withstand the shocks of large stones and the abrasion of sand-laden water. When these Amsco fittings are finally worn to paper thinness, they never burst or shatter. Instead, "slow leaks" develop which act as a safety signal and give you warning that replacement is necessary.

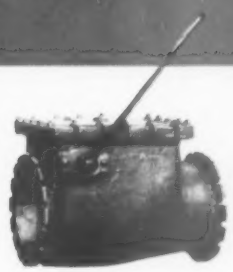
Amsco Sheaves work-harden with use and do not develop cuts or corrugations to wear out cables. Housing breakage is virtually eliminated with Manganese Steel. Nothing can equal the ability of Amsco Manganese Steel Gears to withstand impact and abrasion. And if lubrication is a problem, the self-polishing quality of Manganese Steel eliminates it. These are the features that enable Manganese Steel to pay for itself in economical service.

Sheave for 7-cubic-foot clamshell bucket. 4 ft. 4½ in. outside diameter; weighing 1330 lbs.

56 t. spur gear, 6 ft. diameter weighing 6500 lbs. for suction dredge.



Open-type flap valve



Enclosed-type flap valve

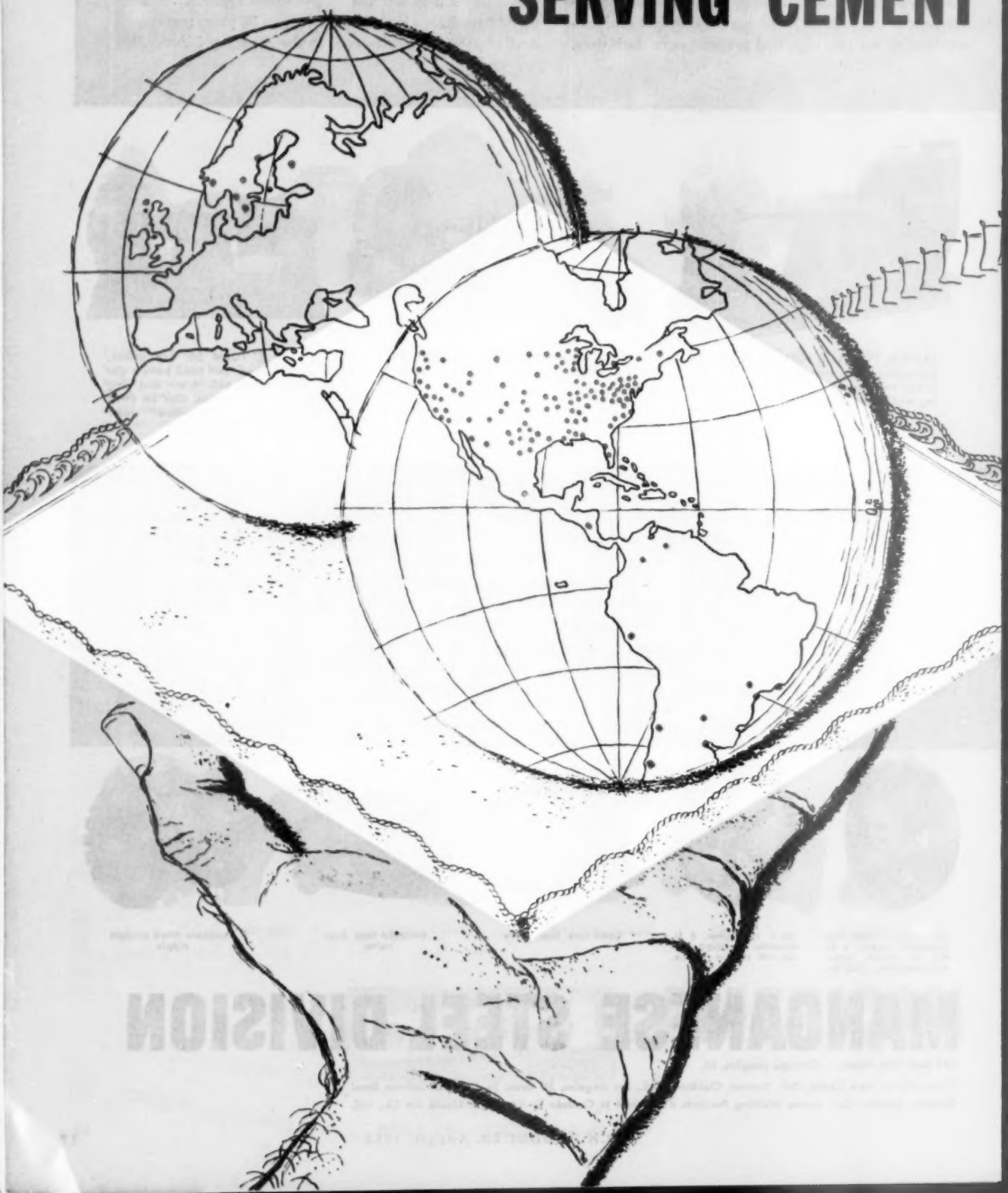
Handhole fitted straight nipple

MANGANESE STEEL DIVISION

377 East 14th Street • Chicago Heights, Ill.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

SERVING CEMENT



. all over the world !

Wherever there's a red dot . . . RITEX has been *on* the spot! From border to border, ocean to ocean—and across the seas, too—Grefco has been serving the cement industry for nearly half a century.

Grefco's patented RITEX has been used in *many more* kiln linings than any other Basic brick—*burned*, *unburned*, or *chemically bonded*. Definitely, RITEX is the pioneer of successful Basic brick linings for rotary kilns burning portland cement clinker, dead burned dolomite, and dead burned magnesite.

142 plants, located all over the world, have purchased RITEX—again and again. These superior, chemically bonded Basic brick have been employed in 30 states of our own nation, two of our possessions, and 15 foreign countries, some as far away as Australia and Japan.

Whatever heat application you may encounter in your operation, Grefco has the answer. For *only* Grefco provides a *truly complete refractories service*.

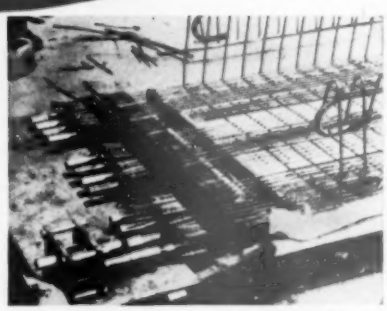
GREFCO

GENERAL REFRACTORIES COMPANY
PHILADELPHIA

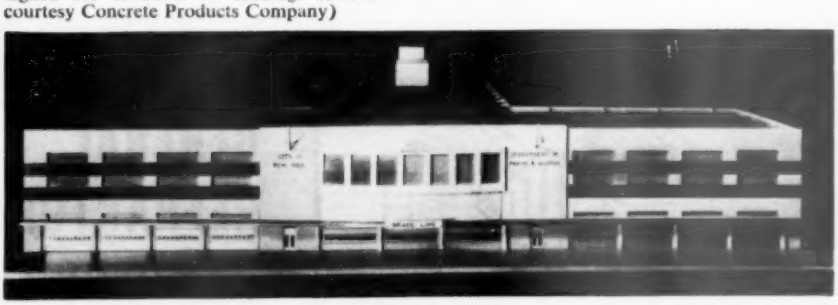
GENERAL REFRACTORIES

THIS PRESTRESSED high pressure concrete pipe line was installed at Hammond, Indiana, in 1939. Photograph shows installation of one of the earliest prestressed concrete pipe line installations in the United States. (Photo courtesy Price Brothers)

THIS PHOTOGRAPH shows the first pre-tensioned concrete bridge in the United States, erected in 1950 by Concrete Products Company of America. The Hockersville bridge, located near Hershey, Pa., was erected in 1 hr. 15 min., using American High Strength Reinforcing Strand. The bridge was designed for H 20 S 16 loading. (Photo courtesy Concrete Products Company)



THIS PHOTOGRAPH shows details of jack and anchorage of pre-tensioned wire on the Hockersville bridge. Note American Welded Wire Fabric used for stirrup reinforcement. This was a State Highway Project. (Photo courtesy Concrete Products Company)



MODEL OF PIER 57, New York City, now under construction using novel method of reinforced concrete box construction. Prestressed concrete stringers, incorporating American Super-Tens Wire will support the main deck. (Photo: Freyssinet Company, Inc.)

THESE PICTURES show the wire pattern, forms, and finished prestressed concrete stringers which are being used in the construction of New York's new Pier 57. American Super-Tens High Tensile Wire was prestressed by the Freyssinet Method.

AMERICAN *Super-Tens* WIRE AND STRAND

for Prestressed Concrete

EVER since the idea of prestressed concrete was introduced to the engineers of this country, American Steel and Wire Division has been producing high tensile wire and reinforcing strand for use in experimental and actual construction projects on prestressed concrete. Our long experience with steel wire and our research of this particular application have contributed substantially to the progress of prestressed concrete construction.

Our engineers have accumulated a vast amount of technical data in regard to pre- and post-tensioning problems and methods and the selection of the proper type of wire or reinforcing strand to achieve pre-determined stress requirements.

Our research has resulted in the production of U·S·S American Super-Tens Wire and Reinforcing Strand specifically designed for use in pre- or poststressed concrete. Whether you require high strength, high creep resistance, maximum ductility, good corrosion resistance, good concrete bonding qualities, easy handling or combinations of these qualities, we have or can design and produce the wire or strand you need. Our specially designed wire is being used in the great modern Pier 57 now being erected in New York City.

We welcome your inquiries as to the use of American Super-Tens Wire and Strand in the prestressed concrete applications you have under consideration. At your service, also, is the experience of our engineers to help you determine the proper, yet most economical, type and form of stressing materials to do your job best. Write for technical bulletins describing the properties of American Wire and Strand for Prestressed Concrete.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO

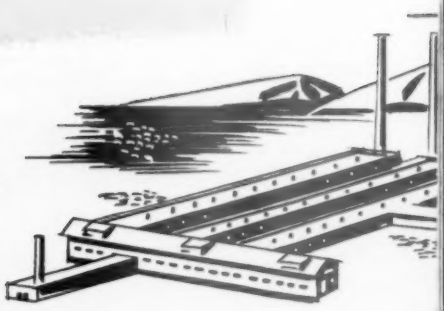
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S AMERICAN *Super-Tens* WIRE *and* REINFORCING STRAND

USS

UNITED STATES STEEL

Cebu



PORTLAND CEMENT COMPANY IN THE PHILIPPINES AGAIN SELECTS NORDBERG CEMENT MACHINERY FOR *another* COMPLETE PLANT

The Cebu Portland Cement Company is one of the important basic industries in the Philippines . . . supplying most of the cement used throughout the Islands.

To supplement their original plant on the Island of Cebu, the company is now building a new modern plant near San Fernando, in La Union Province, northwest of Manila on the Island of Luzon.

Following the end of World War II, Cebu selected Nordberg machinery to modernize its cement plant on the Island of Cebu. Now, Nordberg Manufacturing Company has again been selected by Cebu, to provide all of the machinery, *and the technical "know-how"* for Cebu's new 2,000-bbl. per day portland cement plant. Two 8′-6″x 32′-0″ two-compartment mills, and a 10′x 336′-8″ rotary kiln are included in the machinery being supplied by Nordberg for Quarrying, Crushing, Raw Grinding, Slurry Storage, Burning, Cooling, Coal Pulverizing, Material Storage, Clinker Grinding, Cement Storage and Pack House, Electrical Distribution System, Machine Shop, Laboratory, and General Plant Equipment.

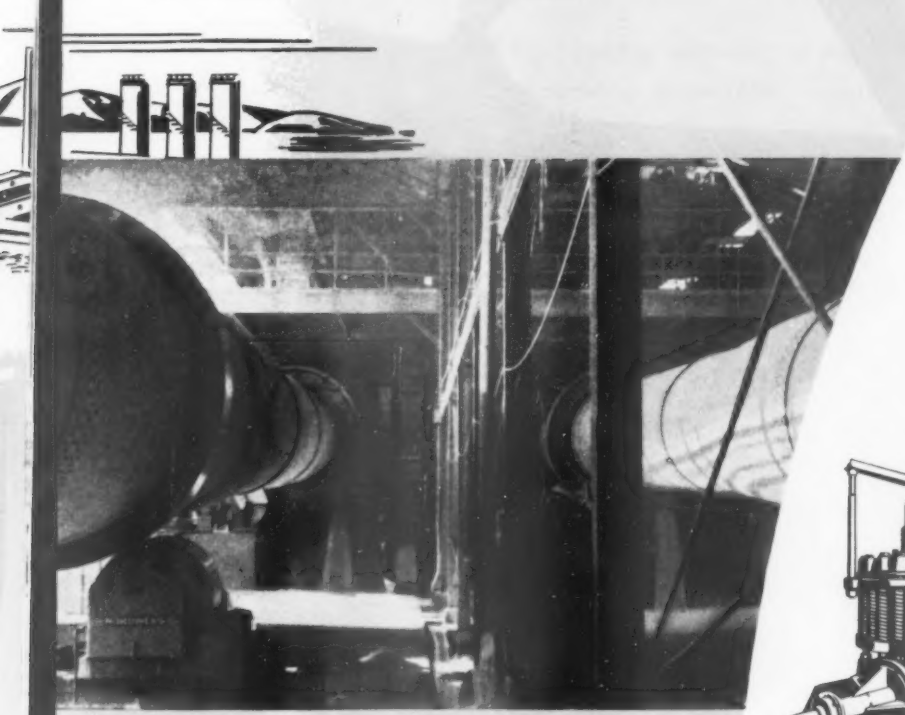
This is another example of the way in which leading producers all over the world have chosen Nordberg throughout, to deliver maximum output at lowest possible cost.

If you are considering a new cement plant, or a change in existing operations, it will pay you to investigate the advantages of Nordberg machinery and the technical and engineering services available.

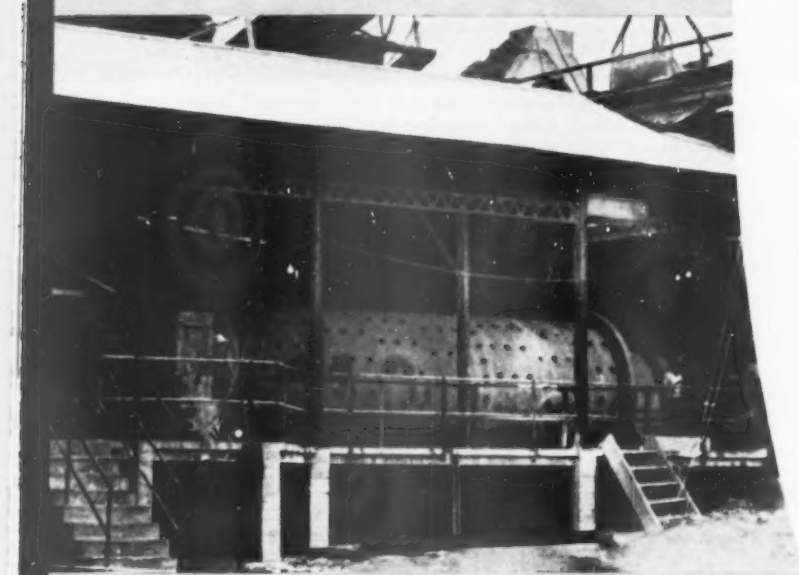
Write for further information.

NORDBERG MFG. CO., Milwaukee, Wisconsin

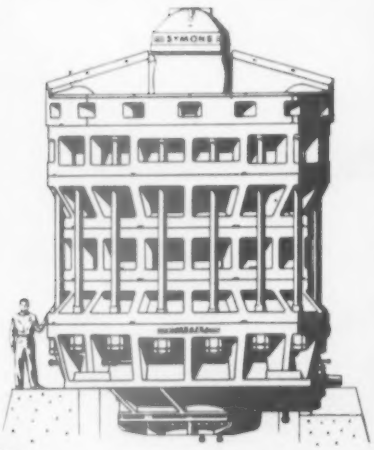
SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD



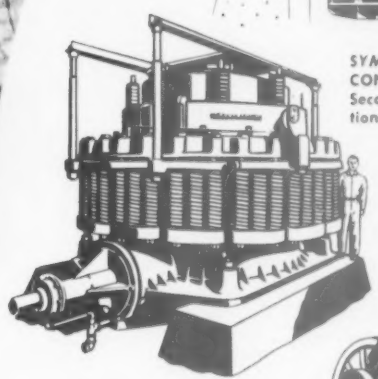
Shown above is a view of the two Nordberg 10′ x 11′ x 173′ Rotary Kilns in operation at the original Cebu plant at Naga on the Island of Cebu, which were installed following World War II.

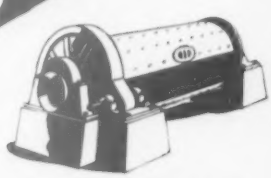


This view shows one of the two Nordberg 8′-6″ x 36′ two-compartment mills used for Raw and Finish Grinding at the Naga Plant.



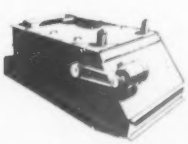
SYMONS GYRATORY and CONE CRUSHERS for Primary, Secondary and Fine Reduction Crushing.



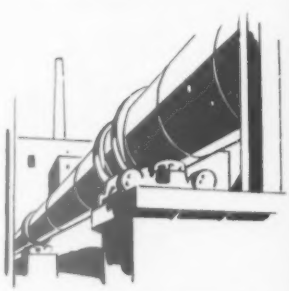


NORDBERG GRINDING MILLS for Wet or Dry Raw Grinding and for Preliminary and Finish Grinding.

SYMONS VIBRATING BAR GRIZZLIES.

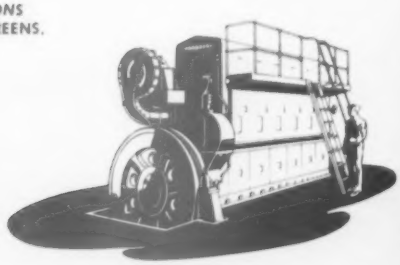


SYMONS HORIZONTAL and ROD DECK VIBRATING SCREENS.



NORDBERG DRYERS, KILNS and COOLERS for Pyro Processing Operations, Drying, Calcining, Burning and Cooling.

SYMONS "V" SCREENS.



NORDBERG DIESEL ENGINES from 10 to more than 10,000 horsepower.

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
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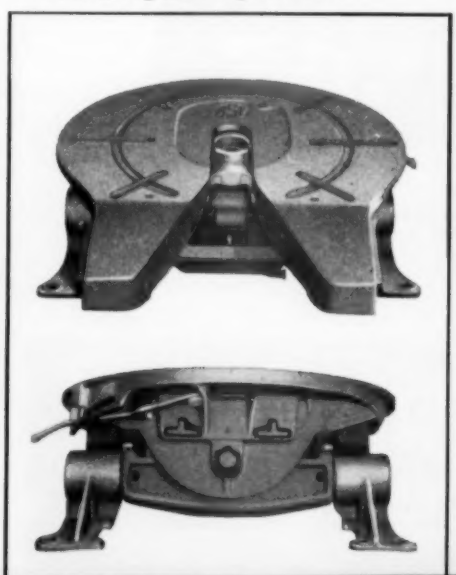
Q153

Marion shovel, loading a 34-ton coal payload into one of 23 Austin-Western trailers powered by Dart tractors. Scene is at Midland Electric Coal Corporation's strip mine near Farmington, Ill.

ASF Safety 5th Wheels have to be tough to stand up in this heavy-duty service, especially during wet weather when tractors are needed at each end of the semi to get it out of soft ground. Because ASF 5th Wheels are so easy to uncouple, in effect Midland has a *flexible pool* of load-carrying equipment and motive power, rather than 23 separate units. The result is fuller, more efficient use of available equipment.

Back and turn on a dime—In addition to quick interchange between motive power and load-carrying equipment, the tractor-trailer is highly maneuverable. ASF 5th Wheels are side-oscillating: even a full load can be safely and easily jacknifed for a short turning radius.

Heart of the semi—the ASF 5th Wheel—36" extra-heavy-duty ASF Safety 5th Wheel made for the rugged service and heavy loads found in off-highway work. Note the heavily reinforced plate; the massive "I" section center beam; the extra-strong mounting brackets.



He speaks through firsthand experience—M. R. Heckard, Superintendent of Equipment, has used ASF Safety 5th Wheels on all semi's for 11 years. He particularly likes the comparatively new 36" wheel shown at left; feels it will cut maintenance costs to a new low.

The Midland Electric Coal Corporation proves that your best investment for efficient tractor-trailer operation is an ASF Safety 5th Wheel . . .

"Best of all—they're easy to uncouple"

Ease of uncoupling is one of the big reasons why ASF Safety 5th Wheels are standard equipment on the fleet of semi's at Midland Electric Coal Corporation's strip mine near Farmington, Ill. M. R. "Marty" Heckard, Superintendent of Equipment, says:

"We use ASF 5th Wheels on all our semi's, and each wheel takes a real beating during the loading and hauling of a 34-ton payload around 30 times a day.

"One of the main reasons why we like these 5th Wheels is because they are easy to keep free of slack. We just add a shim usually once a year.

"Best of all, however, they are easy to uncouple in a matter of minutes. We can easily shop the tractor for maintenance without the trailer, or vice versa. Working on one at a time makes servicing easier, and we avoid tying up the whole semi."

Quick interchange between motive power and load-carrying equipment is a real asset in mining and quarry work. And there's no denying that you get it with a tractor-trailer. But a 5th wheel—or any hitching device—tends to defeat its purpose if it's hard to uncouple.

Easy uncoupling can save you time, trouble and expense, as it has in this modern strip mine operation. But, it's equally important to know that the ASF Wheel *only uncouples when you want it to uncouple*. This is no beefed-up highway wheel. It's made specially for heavy-duty off-highway service, from the "I" section center beam to the side-oscillating plate that absorbs the sidestrain of uneven roadway. Until a twist of the wrist releases the king-pin, it's built to *stay* coupled—come shocks, strains or high water!

Get the facts on the best 5th wheel investment you can make! See your nearest ASF Distributor, or write: American Steel Foundries, Automotive Division, 410 N. Michigan Avenue, Chicago 11, Ill.

remember this . . . about ASF safety 5th wheels

Largest king-pin bearing area of any 5th wheel . . . Stresses absorbed by a larger bearing area—larger than any other 5th wheel—means longer life for king-pin and jaws.

Shorter king-pin bending leverage . . . Jaws grip the king-pin at the top. The pin *stays straight*—and can't "spring" or disengage.

Side oscillation protects equipment . . . 1½° of free oscillation—plus 5½° controlled by rubber stabilizers—absorbs sidestrain of uneven roadway.

Heavy, cast alloy-steel construction . . . Plate is hinged on strong, rigid "I" beam with big 2" pin. Extra large contact area between plate and beam doubles rocker life. Both rocker and cast-steel bracket are bronze-bushed to cut wear to a minimum.

Easy to maintain in perfect operating condition . . . Wear is inevitable, but on ASF Wheels, it's easily counteracted simply by inserting one or more low-cost shims between buffer and housing front wall. Result? Like-new service, without expensive rebuilding!

A quick glance tells you the lock is LOCKED . . .

LOCKED—as quickly shown by the lever and safety latch—which can *only be in these positions* when the jaws are truly locked.

UNLOCKING—with an easy twist of the wrist. Simply move the safety latch up, and pull the lever forward.

UNLOCKED—ready for uncoupling; parts in lockset position. *Handle can only move back to locked position when the jaws are locked in the next coupling operation!*

A 3,000-pound "compression-grip" saves your maintenance dollars . . .

COUPLING — as the king-pin enters the jaws, the jaws are forced back against the exclusive ASF rubber buffer block, building up compression.

COMPRESSING — 3000 pounds are built up before the lock clears the rear jaw, allowing lock to snap to locked position.

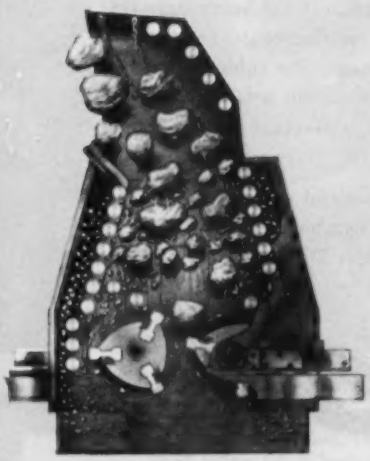
LOCKED—and the jaws *remain* under compression. The grip is like a vise; eliminates the slack and backlash that can cost you money in added 5th wheel and king-pin wear.

CEDARAPIDS DOUBLE

GIVE THE CEMENT INDUSTRY GRE

Quarry run material reduced to minus 3″ at 500 tons per hour

The Inside Story
OF DOUBLE IMPELLER IMPACT BREAKER PRODUCTION



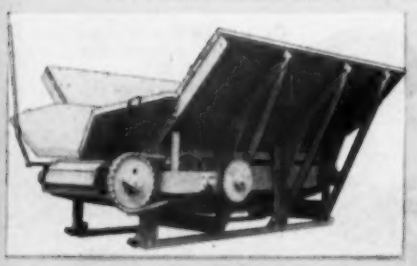
Approximately 50% less contact of stone on metal, because such a high percentage of material is broken in suspension. Extremely high ratio of reduction at very low power costs.
Minimum amount of accessory equipment such as secondary crushers, conveyors, hoppers, screens, elevators, etc.

THE extremely high ratio of reduction of Cedarapids Double Impeller Impact Breakers is a big factor in cutting production costs for crushing limestone or shale for cement manufacturers. Much accessory equipment such as secondary crushers, screens, conveyors, bucket elevators and hoppers can be eliminated. Power requirements are consequently reduced, maintenance is simplified, production is increased.

A large Midwestern cement company has a 5360S Double Impeller Impact Breaker for primary crushing of shale and is reducing quarry run material to minus 3″ in one operation. Another 5360S Double Impeller averaged 600 tons of crushed limestone per hour with a peak production of 724 tons an hour. Dozens of other installations are proving the superiority of the Cedarapids Double Impeller Impact Breaker on some of the toughest reduction jobs you ever saw.

The big feed opening will take material up to 53″ in diameter. Pieces of material are hurled by the impellers against steel breaker bars, scientifically placed around the breaking chamber. Pieces glance off these rounded bars immediately. Can't jam or pack under normal conditions. As the material hurtles through the breaking chamber it collides with other pieces causing further reduction. Once the material leaves the impellers, it continues to be broken without using any extra horsepower.

For complete details about the Cedarapids Double Impeller Impact Breaker, see the Cedarapids distributor nearest you or write for the Double Impeller Bulletin.

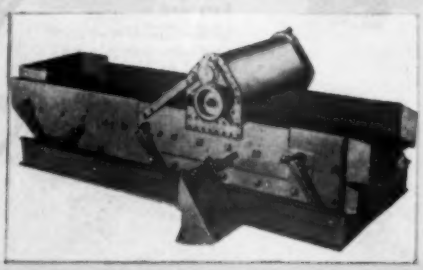


HORIZONTAL VIBRATING SCREENS

More efficient horizontal screening action, highly accurate graduation and large capacity combined to give you faster and more profitable screening at lower cost. Sizes range from 3' x 8' to 4' x 14' in double or triple deck styles. (Bulletin CS-1)

CEDARAPIDS FEEDERS

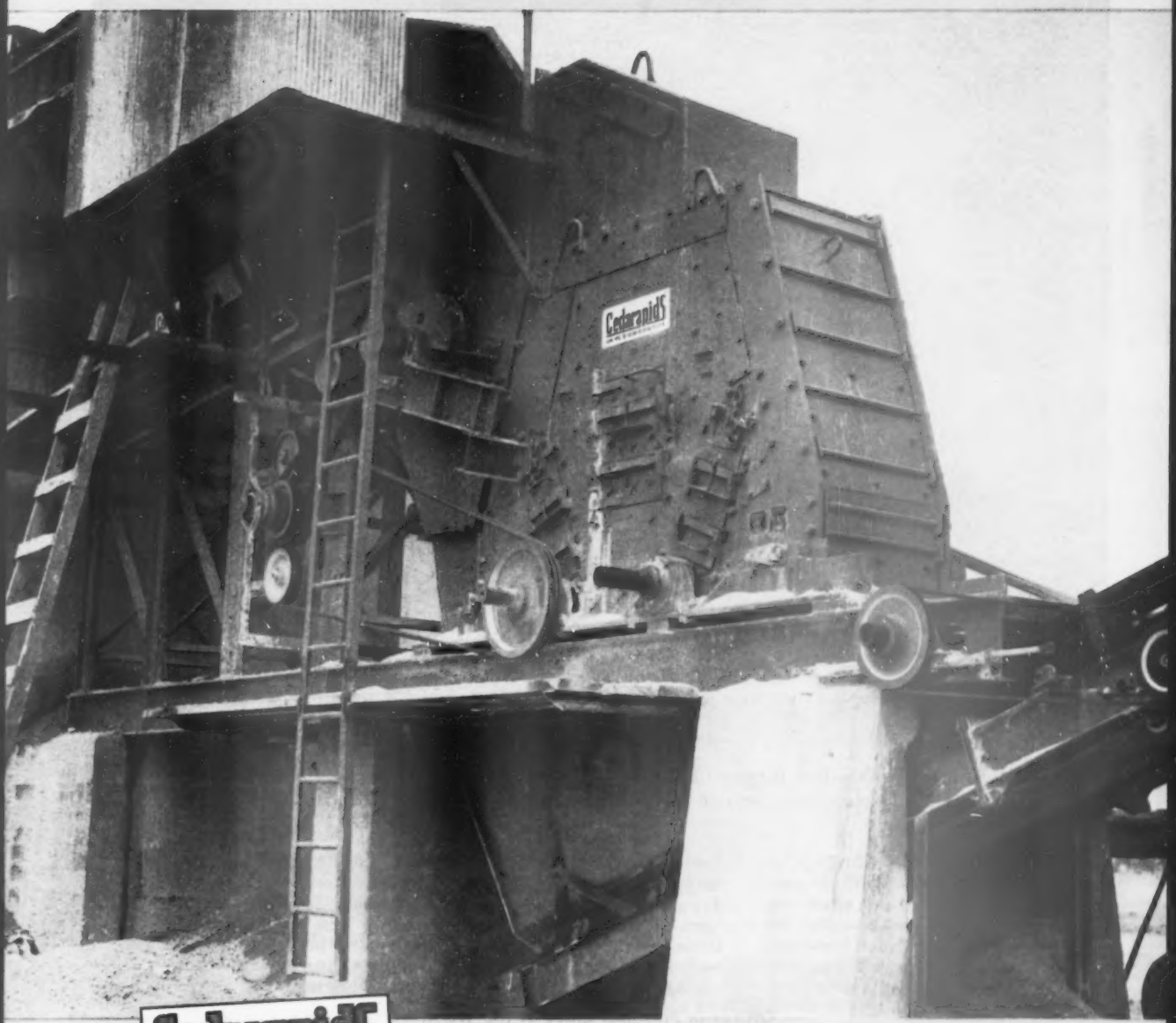
Cedarapids Apron Type or Reciprocating Feeders control the feed, prevent choking and provide a smooth, workable flow of material to crushers, conveyors and bucket elevators, eliminating overloads and surges. Available in a wide variety of sizes for all types of aggregate or bituminous mixing plants. (Bulletin FE-1)



MOTORIZED HEAD PULLEYS

Here's a money-saving departure from conventional conveyor drives. With Motorized Head Pulleys, everything is contained inside the drum, completely protected from grit, dirt and weather, with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime eliminated when you convert your belt conveyor or belt-bucket elevator installations to motorized efficiency! (Bulletin MP-1)

IMPELLER IMPACT BREAKERS
ATER REDUCTION IN ONE STAGE



Cedarapids
Built by IOWA

Headquarters for
COST REDUCING EQUIPMENT

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.

here's muscle to move mountains | IN 6 YARD BITES!

LIMA TYPE 2400—The largest member of the Lima family is engineered and constructed for heavy duty service with higher dump, greater reach, and faster digging cycle.

EASY INSTANT CONTROL — Smooth, "Precision" air control of travel and operating motions lessens operator fatigue. Anti-friction bearings, reduce power robbing friction and step up efficiency.

BIG YARDAGE PRODUCER— Maximum power and fast digging cycles originate from a husky 12 cylinder Diesel engine of approved make. Equipped with torque converter power take-off.

LOW OPERATING COSTS — Truck and rotating bases are integrally cast for extra-rigidity and long life. Adjustments rarely needed on full mechanical clutches. Easy maintenance.

Offices in Principal Cities of the World

LIMA

SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

Ripl-Flo SCREEN with Tri-Slope DECK

SCREENS

Moist Fine Material

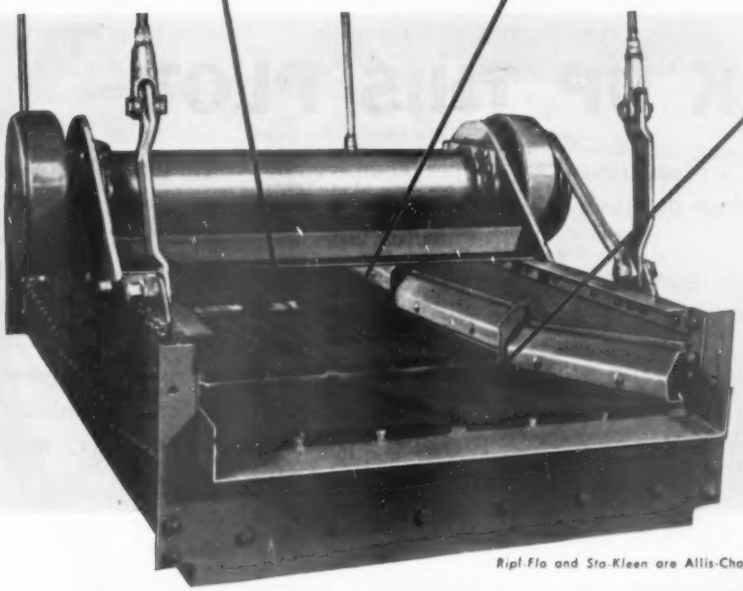
No excessive blinding and no shutdowns to clear the screen! With the "Tri-Slope" deck you can screen moist ½ x 0 to ¼ x 0 granular materials having high surface moisture. And you'll get more capacity than with a single slope deck of the same area.

Each deck section has a slope of 5 degrees less than the preceding section, resulting in a controlled rate of travel over each section.

Moist, fine material passes rapidly over the feed end section to reduce the depth of the bed.

It is then retarded on the intermediate deck to maintain proper bed depth.

It is slowed down still more on the discharge end section to pass marginal size particles.



Each section of the "Tri-Slope" deck is designed for rapid stratification of the bed, resulting in high capacity. Moist, clogging particles are dislodged by the *Sta-Kleen* feature, consisting of bouncing rubber balls between the screen cloth and a ball retaining deck. The A-C representative in your area will gladly give you more details. Call him, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3995

Ripl-Flo and Sta-Kleen are Allis-Chalmers trademarks.

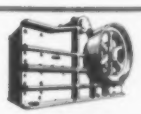
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

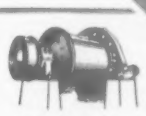
Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills

Vibrating Screens


Jaw Crushers

Gyratory Crushers


Grinding Mills

Kilns, Coolers, Dryers

BREAK UP THIS PLOT

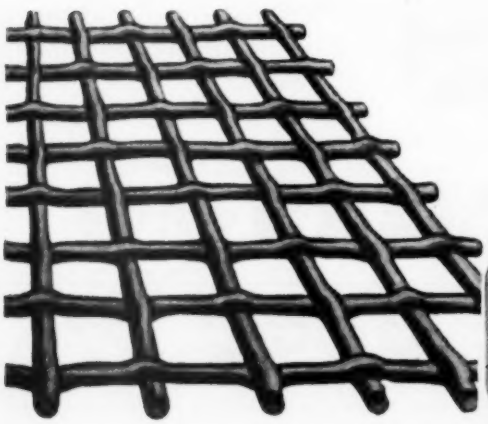
Ordinary screens are in for a rough time when these three troublemakers put their heads together.

One sure way to curb their destructive activities is to install Super-Tempered Precision Space Screens.

Super-Tempered Precision Space Screens stay tight and wear longer under the most punishing attacks of vibration, abrasion and fatigue because they're made of hard and tough super-tempered steel, precision crimped and woven on powerful hydraulic looms. For greater tonnage output at lower cost, it pays to specify Super-Tempered Precision Space Screens. To order, write or phone our nearest sales office.

THE COLORADO FUEL AND IRON CORPORATION, Denver, Colo.
THE CALIFORNIA WIRE CLOTH CORPORATION, Oakland, Calif.
WICKWIRE SPENCER STEEL DIVISION, Atlanta • Boston • Buffalo • Chicago
Detroit • New Orleans • New York • Philadelphia

1746



SUPER-TEMPERED
PRECISION SPACE SCREENS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION
CF&I

"For branch lines I use a half-hitch—pulled up tight

"The detonating wave travels along the Primacord at about four miles per second. At that speed it must pass from the trunk line into each branch 'down-hole' line, where it detonates the charges.

"You can see why these branch connections are important—why they all have to be *tight* and at right angles to the trunk line. And that's where textile-covered Primacord has a big advantage. You can easily make these branch line connections with simple half hitch knots that can be drawn up tight and will stay that way."

Ask your explosives supplier or write for further facts to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Safety Fuse Since 1836

Reinforced Primacord (for deep holes and resistance to abrasion) connects with the **Plain Primacord** trunk line with a simple half hitch, pulled up tight. The textile covering grips securely.

Use the brand of Primacord that meets your needs exactly. In addition to those mentioned, there are: **Wire Countered Primacord,** for deep, ragged holes; and **Plastic Reinforced Primacord,** for deep holes and unusual wet conditions.

Use PRIMACORD®

The PROVED and APPROVED DETONATING FUSE

P-4

Outstanding performance is Standard performance

with B&W Feed Pipes... Tail-Ring Castings

In cement kilns throughout the industry, long-lived B&W alloy Tail-Ring Castings and Feed Pipes have established a firm reputation for outstanding performance and economy by reducing operating costs and contributing to sustained high production.

B&W Tail-Ring Castings withstand temperatures exceeding 1800 F at the feed end of the kiln; standard kiln lining only is needed. These castings provide a kiln opening of proper size, and are designed with overlapping segments, which prevent loss of feed material and allow ample expansion to minimize the possibility of belling out of the kiln shell.

Because greater resistance to heat and wear is "built in" at the foundry, B&W cast alloy Feed Pipes consistently outlast conventional types by wide margins under the most rigorous service conditions. A typical design, illustrated, incorporates a special clamp, located according to specific service conditions, and permitting renewal of *only* the lower portion of pipe after years of punishing service . . . a further cost-saving feature.

Feed end of kiln, with B&W Feed Pipe

Application of Tail-Ring Castings

For detailed information in relation to your requirements write: The Babcock & Wilcox Company, Process Equipment Dept., Barberton, Ohio.

BABCOCK & WILCOX

S-424

Here's Why Bemis is Your Best Multiwall Paper Bag Source . . .

Since 1858, Bemis has SPECIALIZED in making bags. Bemis buys immense quantities of kraft paper and so can get the "pick of

the crop." Bemis laboratories are the watch dogs of paper

quality. Bemis engineers work constantly on new and better bags for diversified products. Bemis' twelve multiwall plants are

strategically located to give unexcelled service.

Bemis

General Offices—St. Louis 2, Mo.
Sales Offices in Principal Cities

ON 900′ HAULS

Dump in one minute — Dump time depends on amount of dirt left in 12-yd. hopper from previous load. Tournapull usually takes 1 min. to unload, can dump in 10 seconds if necessary.

D Roadster makes 3 trips to one for crawler and pan

GEORGE W. McDEARMON of Baton Rouge, Louisiana, uses his D Tournapull as an all-around utility dirtmover at his lightweight building-block plant west of Baton Rouge.

Ordinarily, the Tournapull hauls pit-run clay to the aggregate plant. Where hauls average 900′ one-way, Foreman Landry Daigle estimates the 28 mph "D" makes 3 trips to every 1 made by an 8 mph crawler and pan. Both scraper units self-load in the same pit, dump either directly into a grizzly or into a 45 x 80′ hanger-type storage shed, part of which covers the grizzly.

170′ cycle — 1 min. to load, haul, return

Material stockpiled in the shed is used whenever rain makes pit clay too wet for processing. This "inside" feeding job is handled entirely by the Tournapull. Its self-loading ability and speed enable it to keep well ahead of the 12-yd. grizzly . . . in fact, the "D" often has to take a minute to dump into the overloaded hopper. Load, haul, turn to back over grizzly and return to far end of stockpile usually takes another minute. With cycles running around 170 ft., the 7-yd. Tournapull delivers 25 loads per 50-minute hour . . . all the hopper and plant conveyor can handle.

90% efficient in 4000 hours

"Easy operation," reports Foreman Daigle, "together with speed of cycles and quick maintenance of the Tournapull, are the biggest factors in keeping our production high." With over 4000 hours on the machine, mechanical efficiency is about 90%.

Check into this 7-yd. 122 hp Tournapull for yourself. Find out what its self-loading ability and high speeds can do for you. Your LeTourneau-Westinghouse Distributor will be glad to show you job records of the "D" on both long hauls and short.

Load in 30 to 40 seconds — Self-loading down-grade there about 7%), 7-yd. "D" is heaped in 30 to 40 seconds. Load distance is about 45'. Tournapull delivers 25 loads per 50-minute hour.

Return in 20 to 30 seconds — After unloading, Tournapull drives off grizzly, moves upgrade to top of stockpile, and turns to get another load. Complete 170' cycle takes 2 minutes.

RETURN

LOAD

Turn, position over hopper-Load is topped out as Tournapull gets parallel to hopper. Blade lifted, operator drives ahead, turns, backs up over grizzly.

SHED

Some loads are stockpiled in storage shed for use during rainy weather. Material is piled high at this end of 45 x 80' shed and angled to floor level, so loading can be made down-grade to grizzly.

RETURN

BELT

GRIZZLY

PIT

In normal outdoor operation D Tournapull self-loads blue clay at pit, then hauls about 900' direct to conveyor.

Conveyor belt takes blue clay to processing plant. Company produces 400 yds. of finished light-weight aggregate daily.

900'-ONE-WAY

Tournapull—Trademark Reg. U.S. Pat. Off. DP-416-Q

LeTourneau-Westinghouse Company

PEORIA, ILLINOIS

ELEVATOR "DOWN" TOO MUCH?

Look up your answer here

Having trouble with bucket elevator chains? Here's a good way to avoid getting caught with your "plants down." Use the right chain for the job. Not just a Rex Chain BUT the right Rex Chain.

It's an important point to consider because chain breakage is seldom the fault of the chain. It could be that it's misapplied . . . not strong enough for the job! Just take a look at the table. You'll see the complete Rex Line at a glance. Find the chain you're now using and see how easily you can move up into a stronger chain . . . one that will give you longer service . . . eliminate excessive, expensive down time.

We suggest, too, that you consult your Rex Field Sales Engineer. You'll find he's able to give you a lot of valuable help in chain selection . . . help that will save you plenty.

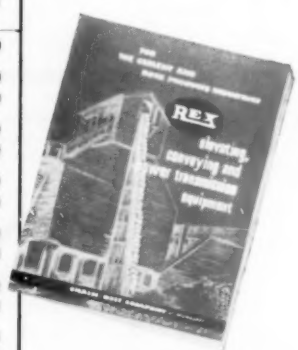
CONDENSED CHAIN SPECIFICATIONS

If You Are Using	And Want a Stronger Chain, We Recommend	Use Same Sprkts.	New Sprkts. Req'd.
†823	825		√
131	S131	√	
S131	S825		√
†825	S825	√	
S825	S102½		√
†830	S830	√	
S830	S844		√
A102B	S102B	√	
S102B	S102½		√
110	S110	√	
S110	S844		√
A102½	S102½	√	
S102½	S111		√
A111	S111	√	
S111	S844		√
†844	S844	√	
S844	S856		√
A132	SA150	√	

*Can also be shipped in Rex Z-Metal which is approximately 25% stronger; furnished with heat treated pins.

†Can also be furnished with alloy pins and manganese bushings.

Chain No.	Pitch	Working Load	Ultimate Strength
*†823 Ley Bushed	4.000	3,150	19,000
*131 Combination	3.075	3,200	24,000
S131 Chabelco	3.075	4,450	40,000
*†825 Ley Bushed	4.000	5,000	30,000
S825 Chabelco	4.000	6,000	50,000
*†830 Ley Bushed	6.000	5,000	30,000
S830 Chabelco	6.000	6,000	50,000
*A102B Durobar	4.000	4,000	24,000
S102B Chabelco	4.000	6,300	40,000
*110 Combination	6.000	4,000	24,000
S110 Chabelco	6.000	6,300	40,000
*A102½ Durobar	4.040	5,600	36,000
S102½ Chabelco	4.040	7,800	50,000
*A111 Durobar	4.760	6,000	36,000
S111 Chabelco	4.760	8,400	50,000
*†844 Ley Bushed	6.000	6,650	40,000
S844 Chabelco	6.000	9,200	70,000
*A132 Durobar	6.050	8,400	50,000
SA150 Chabelco	6.050	15,000	100,000
S856 Chabelco	6.000	14,000	100,000



Get the full story on how the complete line of Rex Chains can help you get the most out of your elevating, conveying and power transmission equipment. Write for Bulletin 52-53 today or call your nearest Rex Field Sales Engineer. Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee, Wis.

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Chain Belt COMPANY OF MILWAUKEE

Atlanta • Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Dallas
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EXPORT OFFICES: 4800 W. Mitchell St., Milwaukee 1, and 19 Rector St., New York City.

UNIFORM FRAGMENTATION

with Du Pont "Extra" Dynamite and "MS" Delay Caps in underground limestone quarry

Face drilled and ready for loading in Franklin Underground Quarry.

Results with "MS" Caps consistently produce more uniform fragmentation.

● Rooms average about 26 feet high . . . 48 feet wide in the underground limestone quarry of the Franklin Limestone Company, Franklin, Tennessee.

Typical shots consist of some 48 holes arranged in vertical rows of six each. These are loaded with Du Pont "Extra"® D-1 Dynamite (40%) and are primed with Du Pont "MS"* Delay Electric Blasting Caps of 25, 50, 75, 100, and 125 millisecond delay periods.

"MS" Caps enable the operators to use less dynamite per blast and to obtain a much better and more uniform quality of fragmented rock. In addition, these caps greatly reduce concussion throughout the mine.

Whatever type of blasting you may be supervising . . . you can always depend on Du Pont Explosives to deliver the best results possible. Ask the Du Pont Explosives representative in your own district for complete information and for technical assistance whenever you may have a special problem. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

*"MS" Delay Electric Blasting Caps are available in 19 millisecond delay intervals: MS-25, -50, -75, -100, -125, -150, -175, -200, -250, -300, -350, -400, -450, -500, -600, -700, -800, -900 and -1000.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Left: Standard Coring Bit, for best results in hard, firm, rock.
Center: Impregnated Coring Bit, for best results in broken or extremely abrasive rock.
Right: Series "M" Coring Bit, for maximum core recovery from coal or fragile rock.

for Faster Drilling and Better Cores at Lowest Cost Per Foot

TAILOR-MADE DIAMOND BITS

To secure best-possible all-round results in diamond core drilling, the bits used must embody the correct combination of design, matrix, size and grade of diamonds, for the particular type of formation encountered. The wide variety of standardized combinations illustrated and described in our new Bit Bulletin enables purchasers to make a satisfactory selection in most cases, but we welcome opportunities to develop special bits to meet unusual conditions or requirements. Write for Bulletin 320 and tell us about your operating conditions.

HIGH-SPEED DRILLING MACHINES

Our wide line of high-speed diamond drilling machines meets every requirement for both core drilling and blast-hole drilling at minimum expense—measured by the results achieved. Modern design, rugged construction, anti-friction bearings and heat-treated alloy-steel wearing parts permit long periods of continuous high-speed operation under the most difficult conditions. Illustrated bulletins, containing complete specifications and working data, mailed on request.

COMPLETE ACCESSORY EQUIPMENT

To meet the requirements of our own contract drilling crews, we are obliged to supply a wide variety of accessory equipment and to carry all commonly-used items in stock for immediate delivery. The same prompt service is available to other diamond drill operators and ordering is made easy by a 28-page catalog which gives all necessary information—including illustrations, piece numbers, weights and code numbers, for ordering by wire or cable. Every operator of a diamond drilling rig should have a copy of Bulletin 31-F and we'll send one free of charge.

WORLD-WIDE CONTRACT DRILLING

For more than sixty years, Sprague & Henwood, Inc. has been a leader in the field of diamond core drilling by contract. During this long period, our crews have completed thousands of contracts successfully, in practically every corner of the globe. Besides exploratory drilling for coal and ore, our service includes foundation-test drilling, grout holes and pressure grouting. Correspondence is invited regarding any diamond drilling job—anywhere. Estimates on request.

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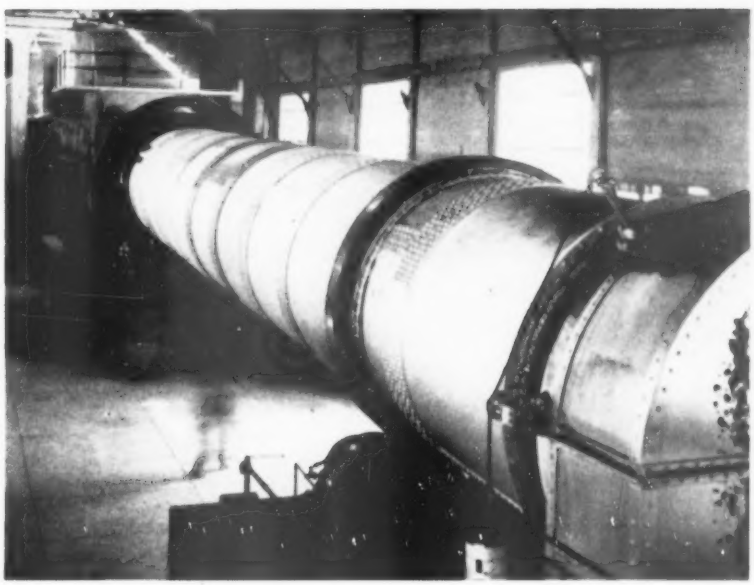
EQUIPMENT FOR MODERNIZING CEMENT PLANTS

Designers and Manufacturers of Complete Cement Factory Installations

Conversion of Existing Plants into LEPOL KILNS our Specialty



Third Lepol Kiln as now on order for Rhodesia Cement Limited, Southern Rhodesia, Africa

"E. M. C." AIRSWEPT TUBE MILLS
for simultaneous drying and grinding of raw materials (5-50 tons per hour).

"E. M. C." PNEUMATIC
Trough Conveyors, Raw Meal Mixing and Homogenization Installations

"LEPOL" KILNS (Dry Process)
LONG KILNS (Wet and Dry Process)
CEMENT MILLS
PNEUMATIC PUMPS for conveying of raw meal or cement (10-120 tons per hour)

ELECTRO-MECHANICAL CONSTRUCTION CO. (PTY) LTD.

171 Main Street, Johannesburg, South Africa CABLES: "Oralabora" Johannesburg

Another Example of
Profitable Non-Metallic Beneficiation
with Heavy-Media Separation

Read How

Kaiser Aluminum and Chemical Corporation Up-grades Dolomite, Reduces "Selective Shoveling," Increases Output and Improves Quarry Efficiency with this pre-fabricated H.M.S. Plant

Kaiser Aluminum and Chemical Corporation imposes a very tough specification on its Nativadad (California) Dolomite Plant—less than 1% silica and not less than 98% dolomite from a deposit of dolomitic limestone intruded by large dikes and sills of high-silica granite!

To produce acceptable kiln-feed it had been necessary to by-pass large dikes and sills or to mine out and discard these high-silica intrusives as waste. "Selective shoveling" made quarrying operations, difficult, costly. At one time, only 38% of the mined material was usable. Beneficiation, too, posed a problem because the specific gravity of acceptable product is within 0.10 of the high-silica waste.

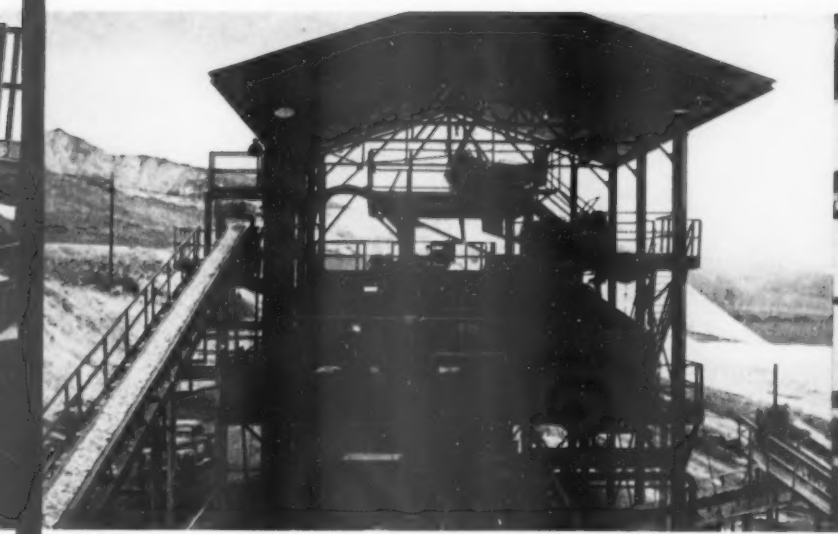
To solve this difficult operating and economic problem, Kaiser installed a 250 tph Heavy-Media Separation plant. Result: A more uniform, low-silica product; better kiln operation, and lower costs all along the line. Typical analyses of end product now show silica approximately 0.3% from a feed running as high as 7.7% and averaging 2.7 SiO_2.

Over 55% of the quarry output now becomes usuable kiln feed . . . a marked gain in quarry efficiency. Ore reserves have been increased. Lower-grade material can now be beneficiated. "Selective shoveling" has been materially reduced with concurrent gains in output and quarry costs.

Treating 4 x ¼" feed with a ferrosilicon-magnetite mixture as the separating medium, this pre-fabricated Heavy-Media Separation plant operates at 2.65 specific gravity. Medium-loss averages well under a half-pound per ton of kiln-feed recovered. Capital costs were minimized by pre-fabricated construction. Operating and labor costs are low.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION 30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK



This is but one of many examples of non-metallic minerals now being beneficiated by Processes and Reagents offered by Cyanamid. Quickly and at low capital cost, you may be able to improve output, cut costs or make "sub-marginal" deposits workable through accurate, low-cost concentration employing one of these processes.

Cyanamid offers a choice of processes covering a full size-range: Heavy-Media Separation, 6 x ¼"; Dutch States Mines Cyclone Separator, ⅜" x 65 mesh, and Froth Flotation, 65 mesh x 0. Test results, design data and operating experience are available to assure predictable performance in minimum time at the lowest cost.

First step to more profitable operation is a discussion of your problems and objectives with a Cyanamid Field Engineer. Your letter or telephone call – or the convenient coupon – will have prompt and intelligent attention.

☐ *We are interested in data on the beneficiation of the non-metallic minerals ringed below:*

ANDALUSITE	FLUORSPAR	KYANITE	RHODOCHROSITE
BARITE	GARNET	MAGNESITE	SALT
CEMENT ROCK	GLASS SANDS	MANGANESE	SILLIMANITE
COAL	GRAPHITE	MICA	SCHEELITE
CHROMITE	GRAVEL	OLIVINE	SPODUMENE
DIAMONDIFEROUS GROUND	GYPSUM	PEARLITE	VERMICULITE
	ILMENITE	PHOSPHATE ROCK	WOLFRAMITE
FELDSPAR	IRON OXIDES	POTASH	(OTHER)

☐ *Send a copy of "Mineral Dressing Notes #19– Heavy-Media Separation Processes for Mineral Concentration"*

Name_____

Address_____

PRINTED IN U.S.A.

Herb Joecks started something in Lannon, Wisconsin!

Herb Joecks is owner of Joecks Bros. Stone Co., one of 30 quarries in Lannon, Wisc. Several years ago he bought a Lull Shoveloader, becoming the first in the area to use rubber-tired front-end loaders for quarry-pit operations. Today he has three. His success with them has resulted in practically every other quarry in the vicinity buying from two to four units of this type.

Joecks uses his Shoveloader for loading gravel, rip-rap and overburden—cutting costs about 50% on these jobs. His ¾ yard machine loads 50 tons into a gondola car in about an hour. He uses loaders for breaking flat stone from strato-layers in the bank and hauling it to cutters. When pumps or other heavy equipment need moving, a Lull unit does it. Last winter, after a heavy snowfall, the three machines cleared the 4-acre quarry in about 2 hours!

Lull Shoveloaders mount on Case, Minneapolis-Moline, Oliver and Sheppard Diesel tractors. Bulldozers, cranes, snow-buckets, forks or sweeper attachments are easily added.

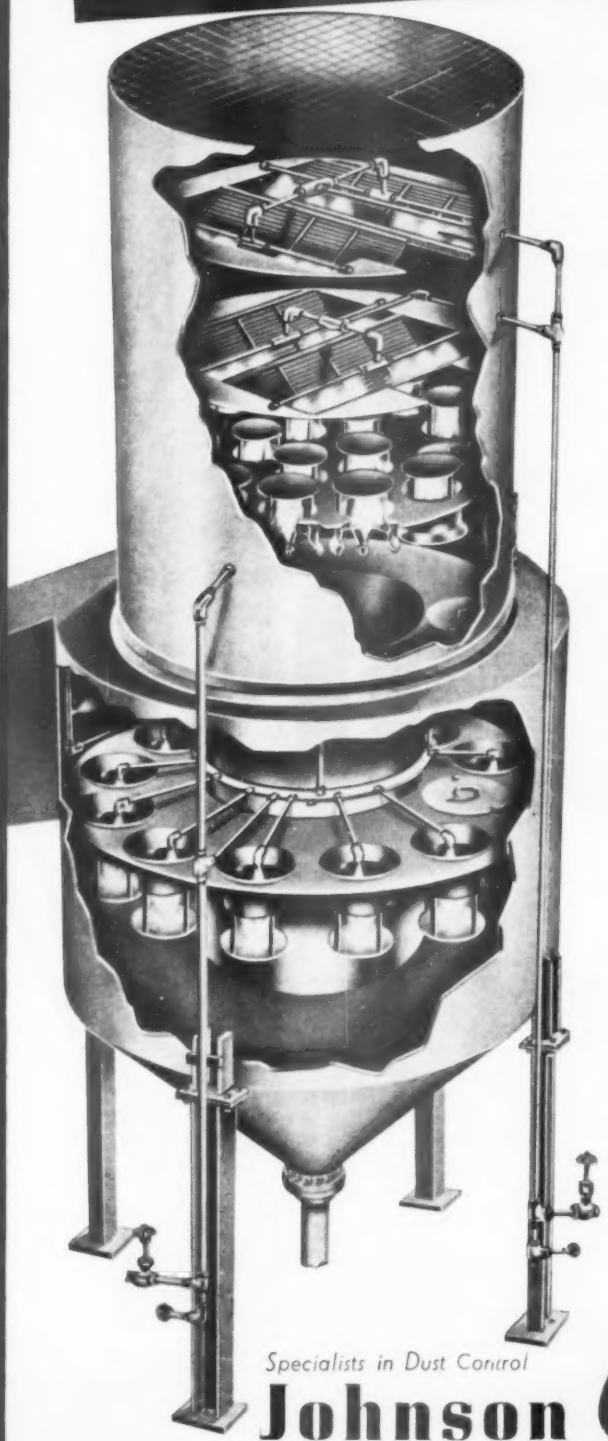
write for Bulletin Ad-32B or contact your Lull distributor for complete information.

THE BAKER-LULL CORPORATION
Formerly the Lull Manufacturing Company

382 WEST 90th STREET • MINNEAPOLIS 20, MINN.
A Subsidiary of the Baker-Raulang Co., Cleveland 2, Ohio

Baker Lull
handling equipment

stop air pollution



with an "LP"

"MULTIPLE-ACTION" SCRUBBER*

• Six different principles incorporated into a single unit make the Johnson-March "LP" Multiple-Action Scrubber the most efficient yet developed for removing dust from stack discharged gases. "LP" Scrubbers are particularly adapted to the control of dust in asphalt plants, limestone plants and wherever stack dust is a problem.

The Johnson-March "LP" Scrubber employs many unique features not found in any other equipment which insure final removal of the low and sub-micron dust particles.

Look at these Advantages...

- **Completely portable . . . easily assembled and relocated**
- **Low back pressure—use with your present fan equipment**
- **Uses less water. Water can be recirculated**
- **Durable, heavy steel plate construction**
- **Low maintenance**
- **Extremely high efficiency dust recovery**

Send Now for this Free Illustrated Brochure. Clip and mail the attached coupon Today.

*Pats. Pending

THE JOHNSON-MARCH CORP. RP-3
1724 Chestnut St., Philadelphia 3, Pa.

Without obligation, I'd like to know more about the use of the Johnson-March "LP" Scrubber in my plant. Please send me the FREE BROCHURE.

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Specialists in Dust Control

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WE'RE SO PROUD TODAY...WE'VE GOT

A NEW BANTAM®

IT'S A CRAWLER

and it sells for only

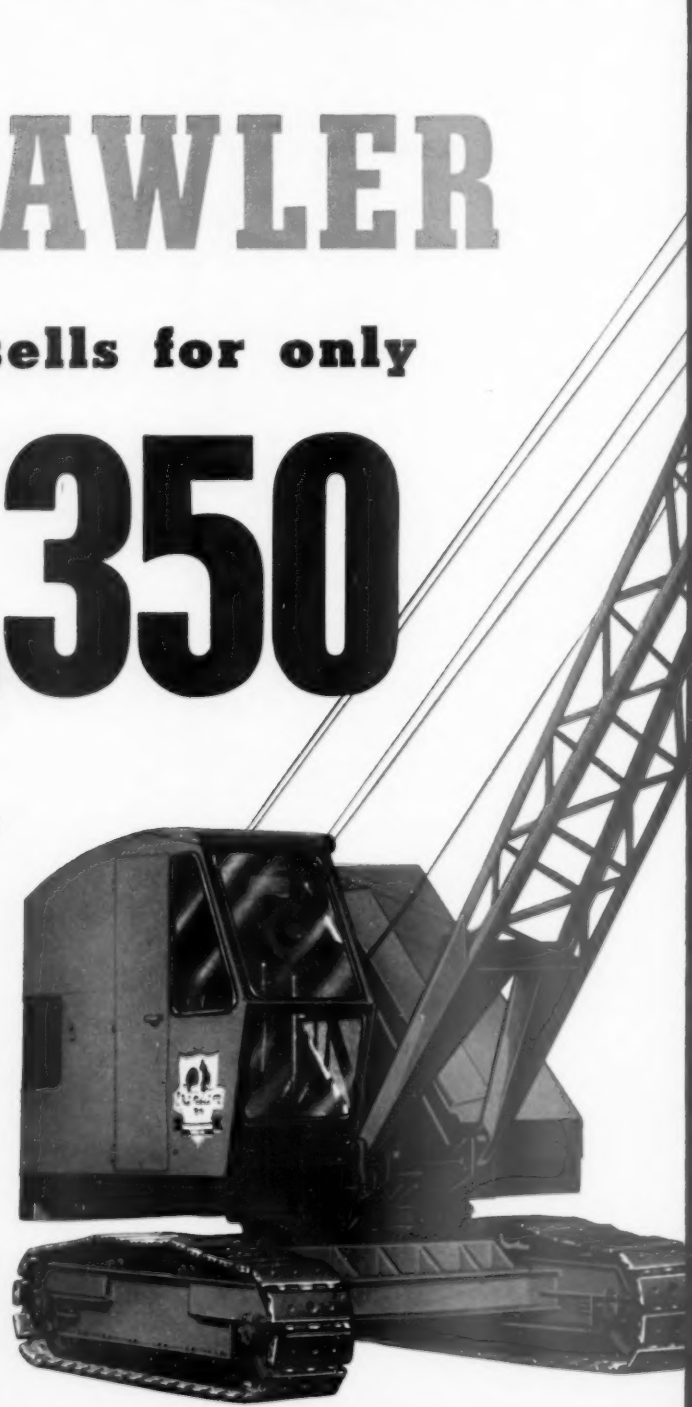
$9,350

F.O.B. FACTORY—BASIC CRAWLER WITH 1400 LB. COUNTERWEIGHT, LESS ATTACHMENT
Price Subject to Change

Your Schield Bantam Distributor is Scheduling On-The-Job Demonstrations Right Now...

See Him Today!

(or write factory to set a date)



ANOTHER NEW PRODUCT OF

SCHIELD Bantam

WORLD'S LARGEST PRODUCER OF TRUCK-CRANES AND EXCAVATORS

...JUST LOOK WHAT YOU GET!

Model

C-35

5 TON — ⅜ CU. YD.

Available with 9 fast-change attachments:

BACK HOE	CLAMSHELL	MAGNET CRANE
CRANE	SHOVEL	PILE DRIVER
DRAGLINE	GRAPPLE	BACKFILLER

✓ 2-SPEED INDEPENDENT TRAVEL—enables the operator to move at varying speeds, forward or reverse, while operating the front end attachment.

✓ LOW GROUND BEARING PRESSURE—2 pad sizes available. 5 lbs. per sq. in. with 16" pads—3⅓ lbs. per sq. in. with 24" pads.

✓ BIG MACHINE STABILITY—longer, wider tracks—and a low center of gravity gives greater lifting capacity.

✓ HIGH SPEED OPERATION—features immediate acting straight mechanical controls, easy positive braking action, fast line and swing speeds.

✓ FAMOUS BANTAM FEATURES—power boom hoist, machine cut gears, anti-friction bearings, 4 hook rollers, greater visibility.

✓ 94-INCH OVER-ALL WIDTH—allows the Bantam to be moved from job to job on standard trailers without special highway permits.

OVER 4,500 Satisfied Bantam customers all over the world tell the story better than we can! Building one size machine and making it a top quality rig has been Schield Bantam's contribution to Shovel-Crane Industry. Bantam's specialization and mass production of this ⅜ cu. yd. machine has meant higher quality at the lowest cost in the industry! The idea of the all-purpose ⅜ cu. yd. power shovel-crane has long since found wide acceptance. NOW . . . you, too, can receive the rewards from this great American idea by letting Schield Bantam solve your lifting and excavating problems! **Whether your work calls for a crawler or a truck mounted crane-excavator, the BANTAM can do your job faster . . . better . . . cheaper! Write *today* for further information on the BANTAM for *your* jobs!**

Schield Bantam Co. 216 Park St., Waverly, Iowa

THIS, TOO, IS ALL NEW!

A BRAND NEW CRANE CARRIER CUSTOM BUILT BY A FAMOUS TRUCK MANUFACTURER

Model **T-35** 6 TON ⅜ CU. YD.

BACK HOE

Crawler working in solid mud . . . crawls out after trenching with no trouble. High flotation enables Bantam to work in any kind of underfoot conditions—muck, mud, sand, etc.

SHOVEL

Handles up to 100 cu. yds. per hour from stock-pile . . . up to 90 cu. yds. excavating in average material. Automatic dipper trip means quick, effortless dumping. Also available with ½ cu. yd. rehandling bucket.

DRAGLINE

Digs 90 cu. yds. per hour in average material, available with perforated or solid buckets. Ideal for gravel pits, ditch cleanout, cutting new drainage ditches, basement excavations, stock-piling, pits, etc.

CLAMSHELL

Ideal for stock-piling and loading out of stock-pile . . . precision excavating of bell holes, special excavating on pipeline jobs, cleanout of trenches. Handles up to 80 cu. yds. of average bulk material per hour.

Modernize YOUR KILN FIRING AND

with

BOWL MILL FIRING

OVER 270 Units installed since 1935 with a total rated capacity of more than *twelve million* tons of coal pulverized per year in the Cement, Lime and burned Dolomite fields alone.

This is the success story of the Raymond Bowl Mill which today has become industry's main reliance for obtaining high efficiency in direct-firing rotary kilns.

The Bowl Mill handles coal of any grade, grindability or moisture content . . . and is capable of continuous 24-hour operation for extended periods without shutdowns.

You can depend upon the Bowl Mill to give you consistent economies in operation, maintenance and supervision. It provides an important factor in lowering cement production costs.

For further details, write for Raymond Catalog No. 62

VISUAL CONTROL STATION

provides a continuous picture of Bowl Mill operation with centralized controls for Temperature, Feed Rates, Exhauster Pressure, Mill Air Flow and Amperage.

COMBUSTION

Raymond

PULVERIZER DIVISION

SINCE 1887

CEMENT CLASSIFYING OPERATIONS

RAYMOND EQUIPMENT

WHIZZER SEPARATION

The **double whizzer** type of Raymond Mechanical Air Separator is an important unit for improving cement production because of its special features:

The whizzer principle of classification maintains consistent uniformity of the finished material so it is easier to meet top specifications.

It provides close control over specific surface areas and one of the most valuable features of all is the fineness adjustment feature. This enables you to cover the fineness range from standard cement to high early strength cement by external adjustment while the separator is running. There is no need of shutting down to make internal changes.

The overall economy of the Raymond Separator is a factor in keeping down the per-barrel cost of cement. Its minimum power requirements, its unusually low maintenance and operating costs, are advantages made possible by extra sturdy construction. It greatly increases mill output when used in closed circuit operations, thus further reducing unit costs.

Raymond Whizzer Separators are equally efficient in handling other non-metallic minerals and manufactured products, either in producing fines, or in dedusting materials to give a product of specified particle size.

FULL RANGE OF SIZES

Built for various capacities in diameters from 4' to 18' standard commercial sizes; also 30-Inch Separator shown at left.

Raymond Laboratory Air Separator is a complete motored unit for classifying test samples.

Write for information about the new Raymond SUPER SEPARATOR for extreme high fineness classification.

ENGINEERING, INC.

1307 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS

Sales Offices in Principal Cities

MEASURE OUTPUT by "KOEHRING WORK CAPACITY"

With Koehring excavators and cranes you gain an important production advantage in extra work capacity. There are some very simple ways to check this. Take lifting capacities, for instance. The machine with the heaviest lift capacity not only picks up larger crane loads — it also has more stability and power to increase shovel, dragline and clamshell output. Be sure to check lift ratings, and other clear-cut measurements of "KOEHRING WORK CAPACITY" before you buy any excavator or crane. Your Koehring distributor has important figures to show you. See him soon.

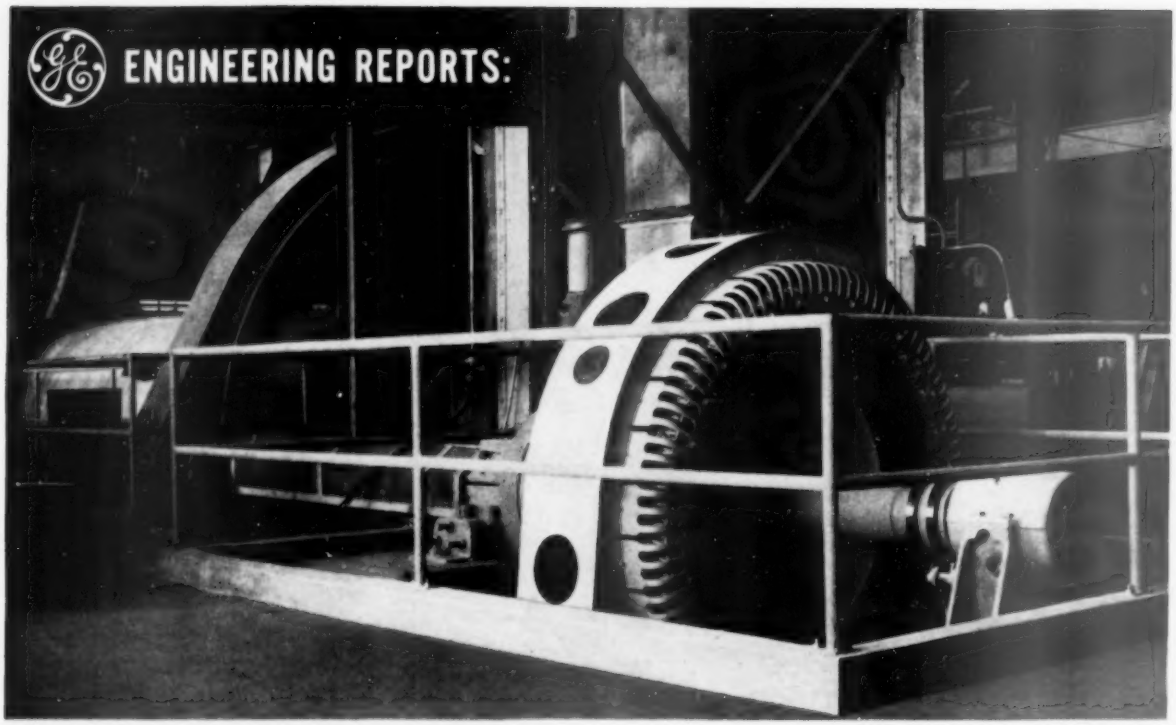
K331

lift capacities up to 79½ TONS . . . ½ to 2½ YARDS dipper capacities

BIG-PRODUCTION TEAM — Loading out big-chunk rock, this Koehring 1½-yard shovel is teamed up with Koehring 6-yard Dumptors.® Fast-spotting Dumptors move in close, keep shovel swing short. Square 8 x 8-ft. body permits loading over side or end. No-turn shuttle hauling and instant gravity-dump speed haul cycles.

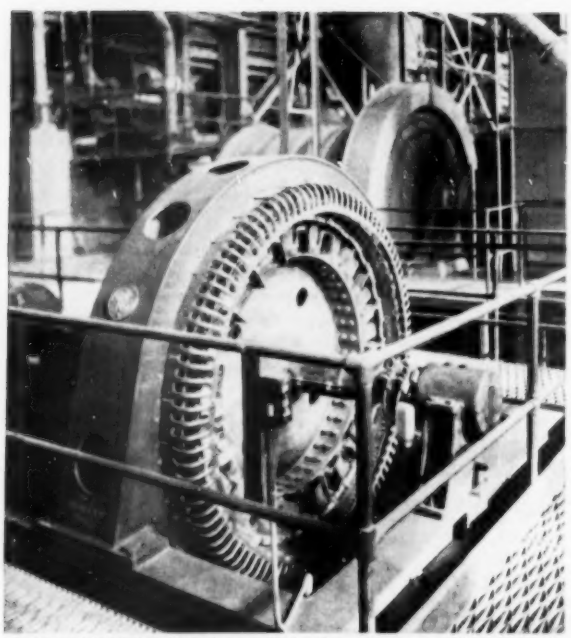
KOEHRING Company MILWAUKEE 16, WISCONSIN

Subsidiaries: Parsons • Kwik-Mix • Johnson

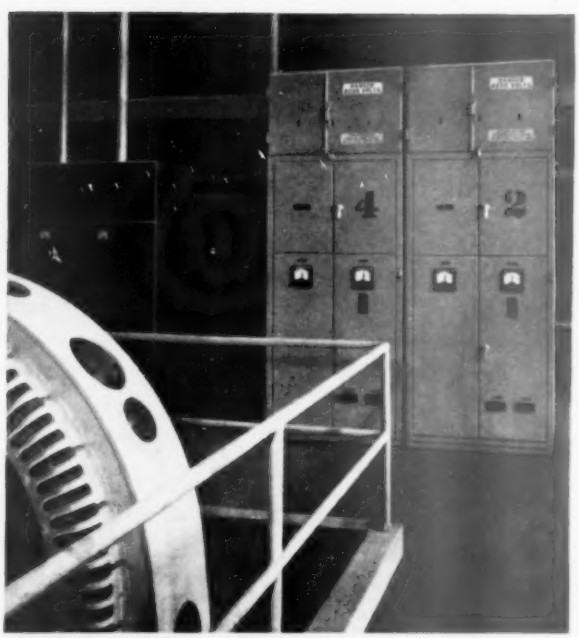


HIGH OPERATING EFFICIENCY is inherent in G-E low-speed high-voltage synchronous motor drives for large pulverizers. In a California cement plant, eight of these General Electric synchronous motors are used to drive the finishing mills.

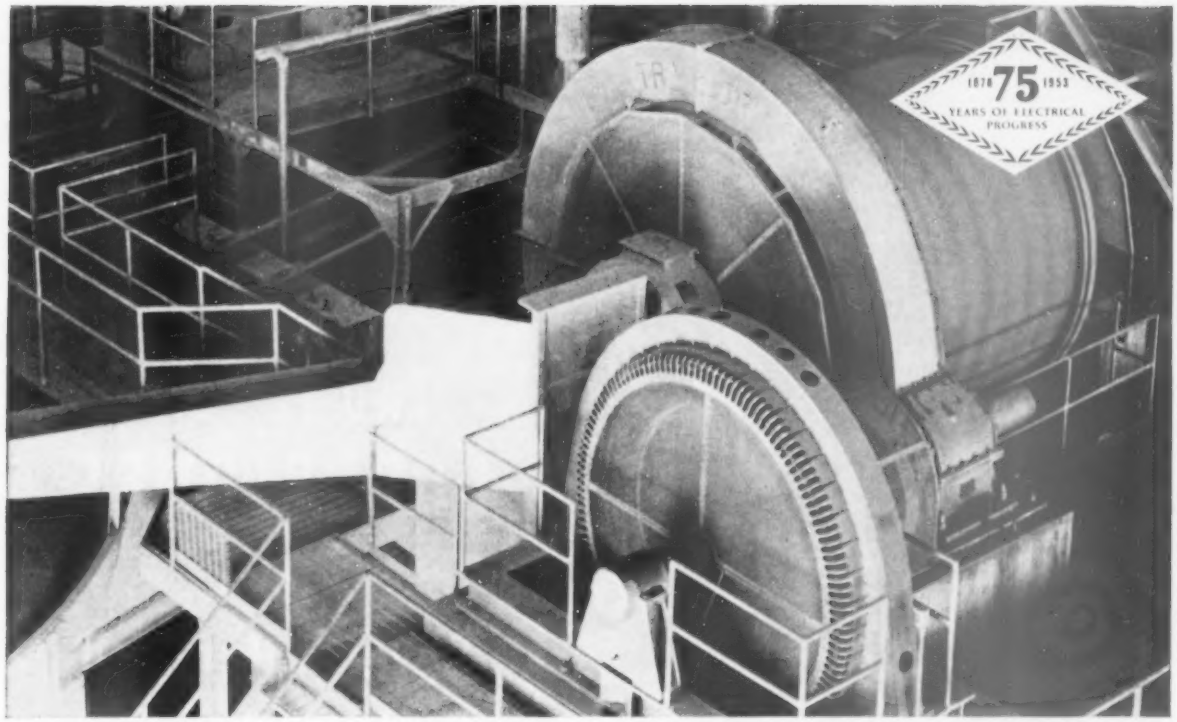
High-voltage drives for large



LESS MAINTENANCE is needed when fewer and larger mills are driven by high-voltage synchronous motors. An example is this G-E 500-hp, 2300-volt unit driving a ball mill.



SPACE-SAVING General Electric limitamp high-voltage motor control panels for synchronous motors provide adequate short circuit protection with high-IC current-limiting fuses.



IMPROVED POWER FACTOR that cuts plant power bills is another advantage of General Electric synchronous motors. This 500-hp, 180-rpm, 4160-volt unit in a Colorado cement plant drives a primary wet ball mill that is used in raw grinding.

pulverizers boost cement output

G-E APPLICATION ENGINEERS, experienced in cement plant problems, plan and integrate electrical systems to meet your plant's specific needs.

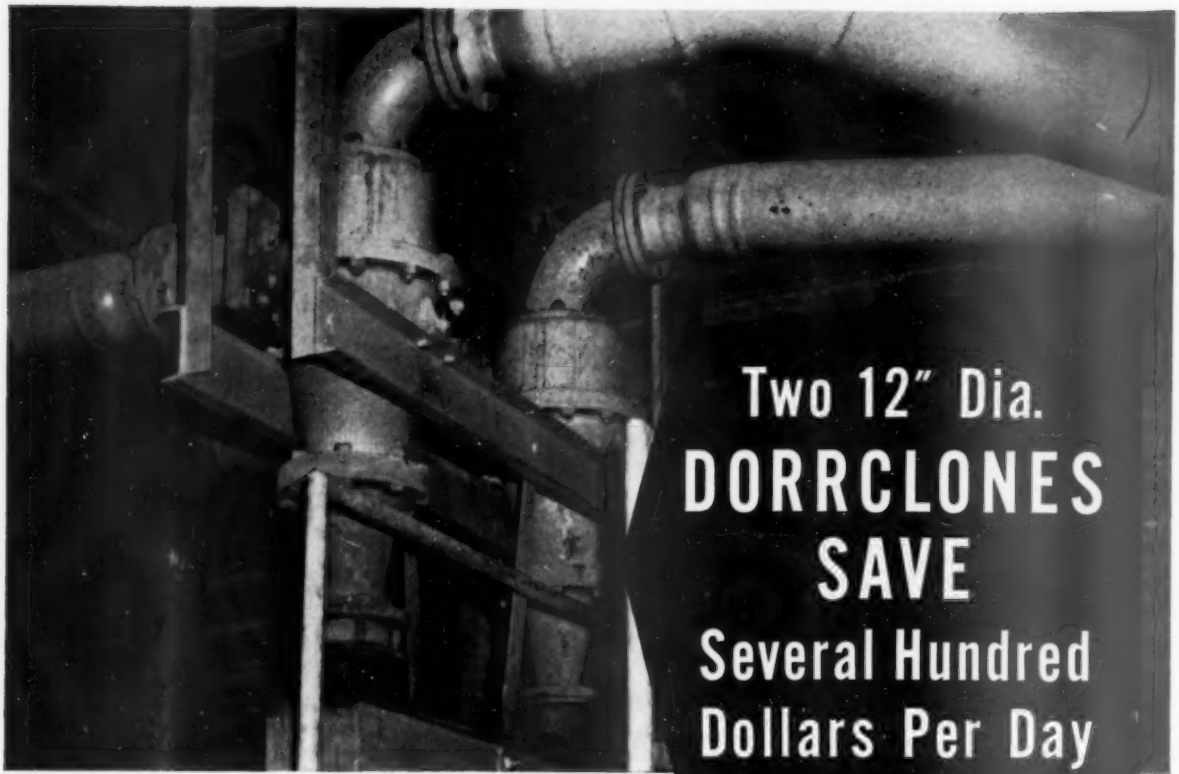
As part of an electrical modernization plan, they also reduce maintenance, cut plant power distribution costs

One way to cut unit costs per barrel of cement today is through greater continuity of production—using large, high-output pulverizers driven by efficient, high-voltage 2300- or 4160-volt motors and control. Many cement plants, for example, have found it pays to replace several small units with a single large mill driven by a General Electric high-voltage synchronous motor with limitamp control. Maintenance is less, output higher. Moreover, with power distributed at high voltage, power losses and first costs are cut.

Money-saving, production-boosting drives like these are used by General Electric engineers when they plan and integrate an electrical system to meet *your* cement plant's particular needs. Find out how they can help you modernize electrically today to increase your cement output tomorrow. G-E engineers can also show you how you can modernize step by step to keep today's production going. Contact your nearest G-E Apparatus Sales office and ask for Bulletin GEA-5469, or write to General Electric Company, Section 658-10, Schenectady 5, New York.

Engineered Electrical Systems for the Rock Products Industry

GENERAL ELECTRIC



Two 12" Dia. DORRCLONES SAVE Several Hundred Dollars Per Day

On Raw Clay For Cement Manufacturer . . .

Problem: A Southeastern cement manufacturer needed clay of a certain composition for his mix. A local deposit was available but silica content ran too high for direct use. Alternatives were — bring in clay of a suitable grade from a distance . . . or find an economical way to up-grade the local material.

Solution: Two 12" dia. DorrClones were installed to classify the raw clay slip prepared from the local deposit. Required grades for the mix are produced at savings averaging several hundred dollars per day on raw clay costs.

Here's another case where the unique classification features of the DorrClone have paid off in a wet processing flowsheet. At this plant, three types of cement are produced . . . each requiring a specific grade of clay in the raw mix. Two 12" dia. DorrClones degrit high silicon content clay from a local deposit to supply all three grades. Equally important, silica is reduced to the desired amount in each grade simply by varying the feed pressure to the units. No additional dilution is necessary and the excess silica is removed as a low moisture underflow product.

If you have a desliming or degritting problem, there's a good chance that the DorrClone, with its high-capacity-for-size and ability to handle flocculent or heavy pulps, will be the solution. If you'd like further information on this flexible new unit, write for Bulletin No. 2500 to The Dorr Company, Stamford, Conn.

DorrClone is a trademark of The Dorr Company, Reg. U.S. Pat. Off.

DORRCO

Better tools TODAY to meet tomorrow's demand

DORR

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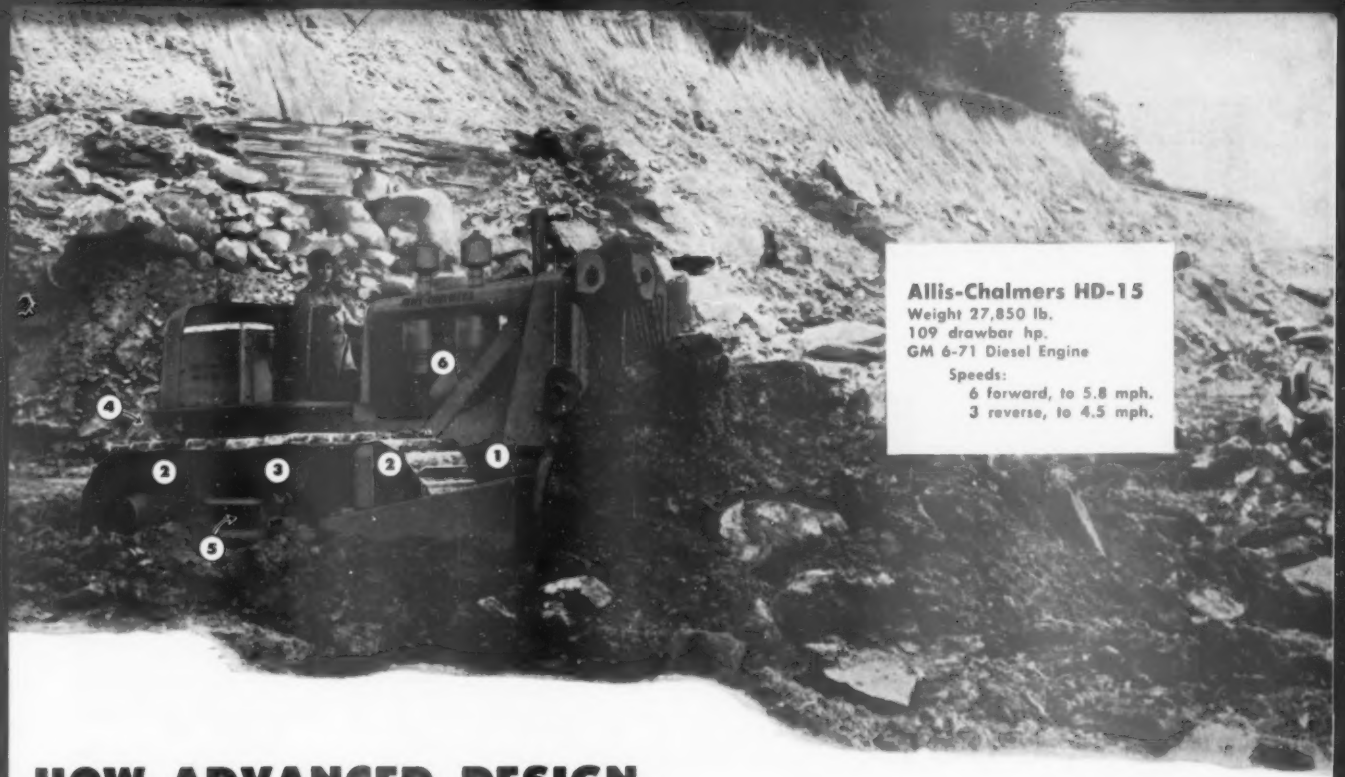
THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.



HOW ADVANCED DESIGN

Makes Allis-Chalmers Tractors more dependable

These heavy-duty tractors have toughness and ease of servicing to match their outstanding performance ability. Here are some of the advanced design features that provide extra strength and protection — keep Allis-Chalmers tractors on the job more hours:

1. One-Piece, All-Welded Structural Main Frame . . . strong and firm without a single ounce of excess weight — absorbs all vertical and horizontal stresses.

2. Extra Large Idler and Sprocket eliminates rocking action, puts more track on the ground for greater stability and better traction.

3. Spring-Loaded, Positive Seal keeps dirt, moisture and grime from damaging truck wheels, idlers and support rollers . . . you lubricate them only once every 1,000 hours.

4. All-Steel, Welded A-Frame Track Stabilizer permits free track oscillation, yet keeps tracks rigidly in line and absorbs thrusts and twists from shock loads and working on uneven terrain.

5. Oil Enclosed Track Release Mechanism reduces track maintenance and breakage. An adjustable screw lock provides positive holding action that maintains adjustment at required setting.

6. Engine Not Used as Structural Member — no strain is transmitted to it. Engine weighs less per horsepower developed, because of 2-cycle design — has modern unit injection.

UNIT CONSTRUCTION SAVES SERVICE TIME

With Allis-Chalmers *unit construction*, major assemblies are easily removed without disturbing related assemblies. This brings real savings in time and money, puts tractors back to work faster. It assures better inspection and maintenance, too. Servicemen find it easy to remove major parts to correct trouble before damage develops.

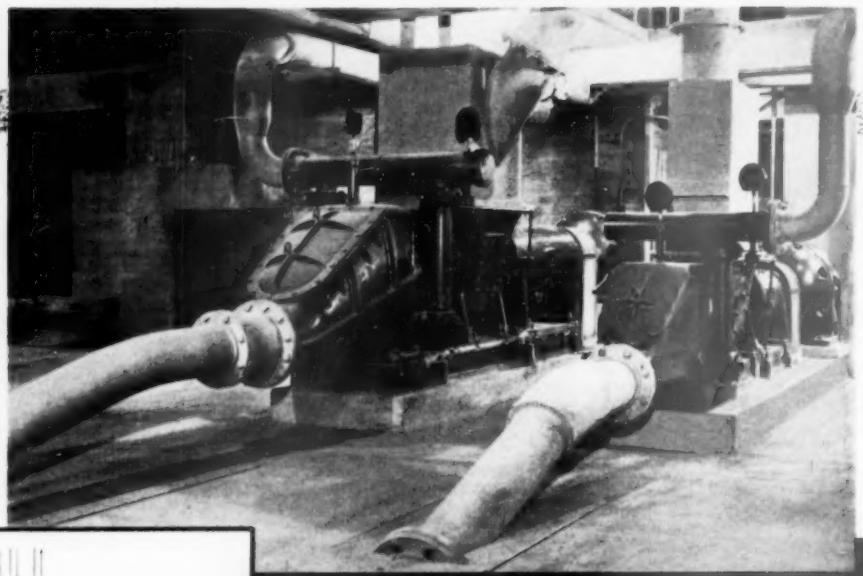
Let your dealer tell you more about the toughness of Allis-Chalmers tractors, their time-saving unit construction — and their unequalled lugability and work power.

ALLIS-CHALMERS

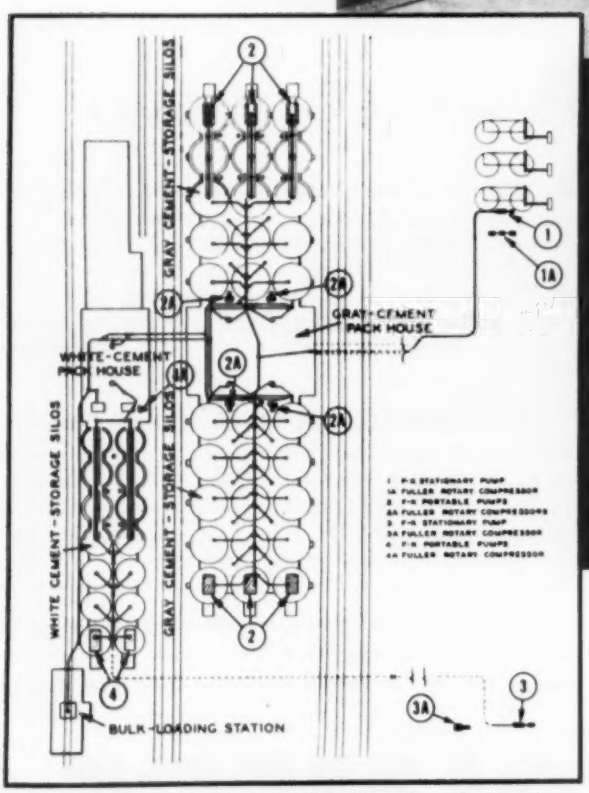
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Conveying Cement in Bulk

for the producer



Two Fuller-Kinyon Pumps in a Southern cement plant. One conveys raw materials to storage; the other finished cement to storage.

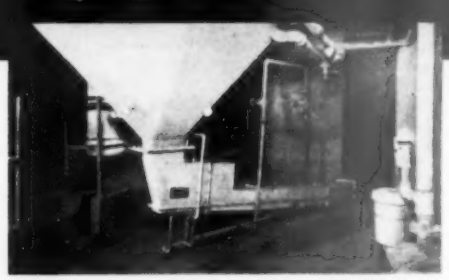


A typical, modern cement plant using Fuller-Kinyon Pumps for conveying finished cement to storage, from storage to packer bins, and loading.

During the past 27 years, Fuller Company has worked very closely with the cement industry. Much of its research, manufacturing, and service has been directed toward the industry, not only from the standpoint of better production in the cement plant, but also in the more efficient handling of the finished product by the user in ready-mixed and concrete-block plants, and on large construction jobs.

The Company aim to anticipate the needs of the industry—to design and build better equipment that will perform more efficiently, at the lowest possible operating cost; to better working conditions.

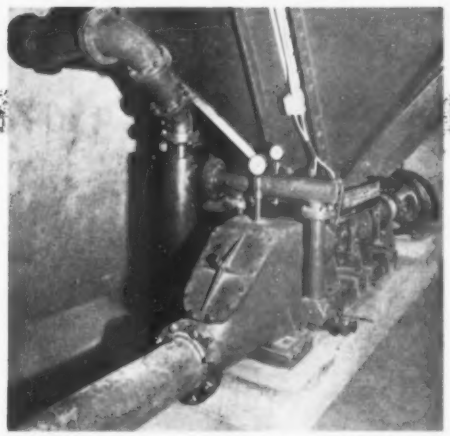
This policy has had its reward . . . the



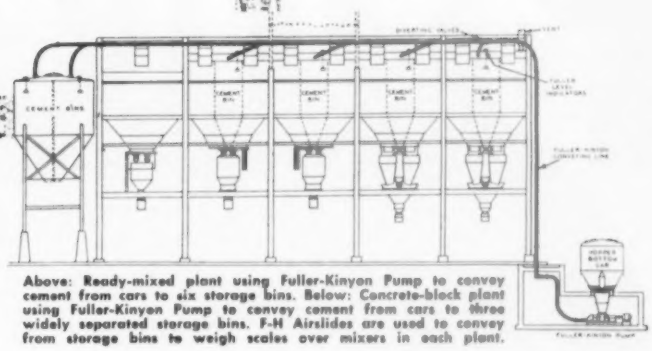
F-H Airslide conveying cement raw materials from bin to elevator, for kiln feed.

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS . . . COMPRESSORS AND VACUUM PUMPS . . . FEEDERS AND ASSOCIATED EQUIPMENT

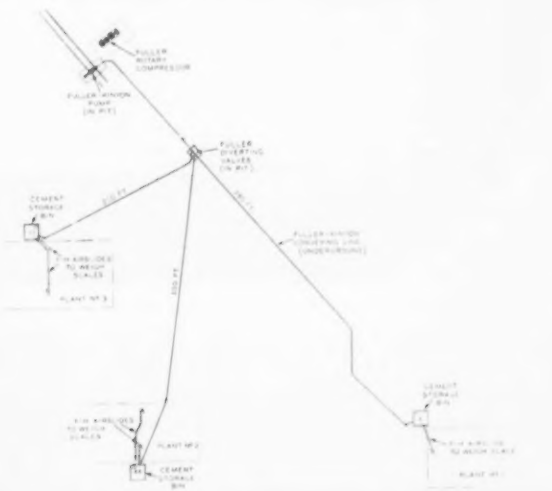
. . . for the processor



Fuller-Kinyon Pump in pit underneath railroad track, conveying cement to storage in a ready-mixed plant.



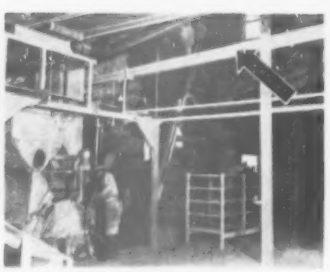
Above: Ready-mixed plant using Fuller-Kinyon Pump to convey cement from cars to six storage bins. Below: Concrete-block plant using Fuller-Kinyon Pump to convey cement from cars to three widely separated storage bins. F-H Airslides are used to convey from storage bins to weigh scales over mixers in each plant.



industry, as a whole, has taken full advantage of it . . . practically every cement plant in the United States, and many in foreign countries, uses Fuller equipment wherever possible. Likewise in the plants manufacturing cement products, you will find Fuller equipment unloading and in-plant handling of cement and other ingredients used in producing the finished product. A large majority of the large dams built during the past few years used Fuller equipment for unloading and conveying Portland cement.

We shall be glad to send you literature covering any of the equipment shown here. Write today.

Two Airslides conveying from storage bins to weigh scales in plants No. 2 and No. 3.



Airslide delivering to weigh scale over mixer in plant No. 2.

Fuller-Kinyon Unloader unloading cement from box car.

Fuller

FULLER COMPANY Catasauqua, Pa.

G 871 - 2188

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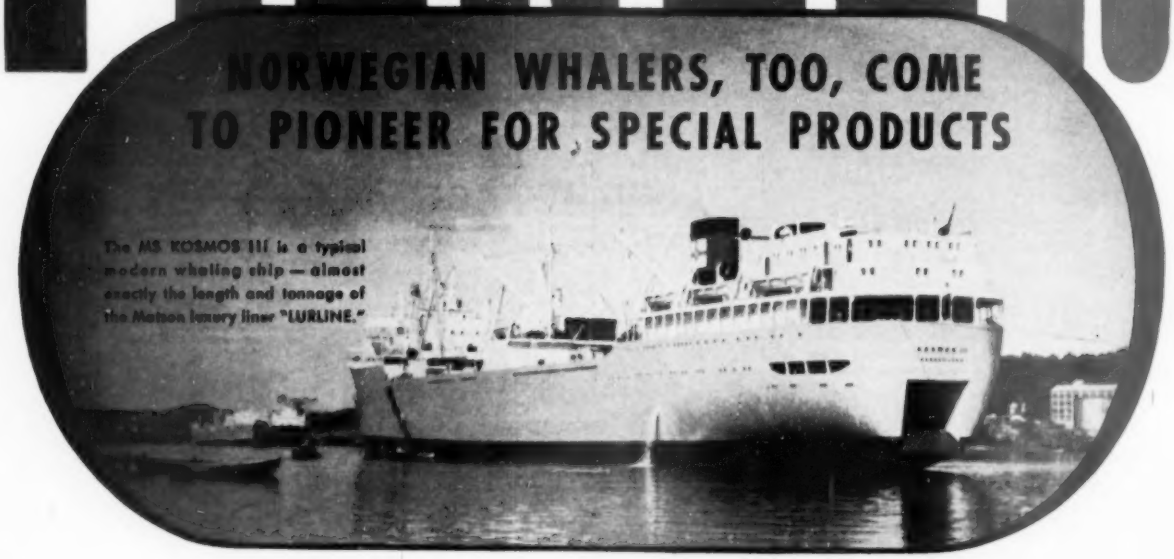
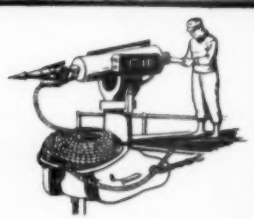
Industrial rubber products especially built for LONG SERVICE

PIONEER

NORWEGIAN WHALERS, TOO, COME TO PIONEER FOR SPECIAL PRODUCTS



The MS. KOSMOS III is a typical modern whaling ship — almost exactly the length and tonnage of the Matson luxury liner "LURLINE."



The efficiency with which the Norwegians hunt down a whale and reduce it to ACTH and a thousand other usable items compares with the best in any industry. Eight to fifteen big, fast whale-hunting ships equipped with harpoon guns kill the whales, blow them up with air to keep them afloat, and then tow them to a mother-ship like the KOSMOS III. This huge ship is a floating whale-oil factory fully equipped with blubber boilers, bone processing apparatus, canning plants, pharmaceutical laboratories, deep freezers, repair shops, and oil storage tanks. She also serves as headquarters for the 8,000 men taking part in each expedition.

Many varieties of Pioneer hose and belting are used in these operations, because Pioneer could furnish the products to best combat the heat, the cold, the oils, the acids, and the other hazards of this rough-and-tumble North Atlantic industry. You, too, will appreciate the special skills and special attention which are yours when you call your nearest Pioneer Rubber Mills representative. If he is not listed in *your* directory, let us furnish you with his name and address.

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faster work cycle...
higher output...
lower maintenance

these are advantages you get with

TORQUE CONVERTER LOADING

brought to you by the

TL-10 TRACTO-LOADER

NO RAMMING, NO BUTTING, NO ENGINE STALLING when you get your load with the TL-10 Tracto-Loader. You crowd steadily into the pile, using only the foot throttle and bucket control levers — wheel spinning is practically eliminated. That's because the torque converter drive is constantly and automatically adjusting forward speed against loading resistance. This means faster loading, less strain on equipment and greatly reduced tire wear.

What's more, bucket action is always snappy and powerful, because speed of engine and hydraulic pump is never dragged down — even when forward motion is stopped.

Ask your Allis-Chalmers industrial tractor dealer to tell you of the many additional Tracto-Loader features. Better yet, let him give you a practical demonstration. When you see the advantages of torque converter loading on your job, you'll know what we mean when we say:

Never-Anywhere-
A WHEEL LOADER LIKE THIS!

SINGLE LEVER CONTROL speeds work cycle and output. No gear shifting on most loading jobs. Two multiple disc clutches are built right into the transmission. One is for forward, the other for reverse. Both are operated by simply pushing or pulling a single lever. Reverse is almost twice as fast as forward.

HIGHLY MANEUVERABLE Bucket over drive wheels utilizes weight of load for greater traction . . . eases weight on rear steering wheels for fast maneuvering. Turning radius is only 11 ft. at tip of bucket . . . works where smaller machines are normally used.

TL-10 TRACTO-LOADER
46 brake hp. — weight 11,400 lb.
Four speeds forward and reverse
See your nearest Allis-Chalmers Industrial Tractor Dealer.

TRACTOMOTIVE
TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

METALLIC ORE

LIMESTONE

MINERAL ORE

you name

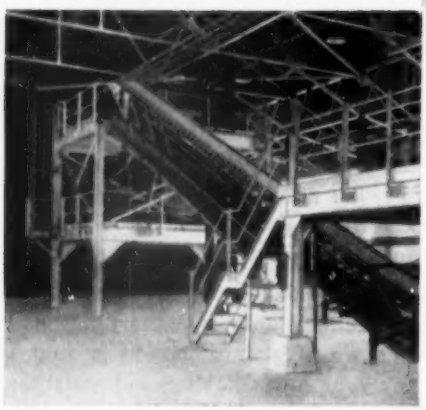
CLINKER

HEAVY CHEMICALS

SAND

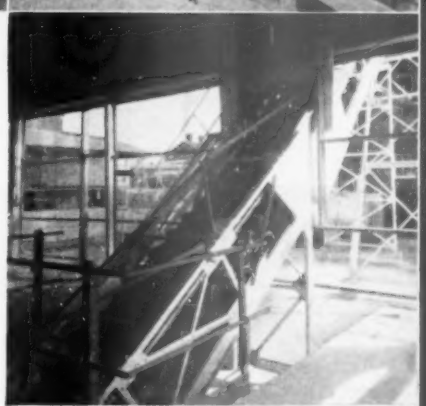
SINTER

Rex Heavy-Duty Pan Conveyor with 100-foot centers carrying lime rock from a gyratory crusher in a cement mill.



⬆ Rex Cast Metal Pan Conveyor carrying sintered manganese nodules.

⬅ Rex Leakproof Conveyor with outboard rollers handling flake alkali in a chemical plant.



Hot material is easy to handle with a Rex Pan Conveyor. This one is moving hot lime from kilns to storage building.

CHAIN BELT REX COMPANY ®

Chain

CEMENT ROCK

it !

COAL

NON-METALLIC ORE

WE'LL HELP YOU HANDLE IT AT LOWER COST WITH REX® APRON OR PAN CONVEYORS

When to Use an Apron or Pan Conveyor

Here are some of the circumstances and conditions that call for the use of apron or pan conveyors rather than other types.

Material handled is hot—over 350°F

Material handled is very abrasive or sharp-edged

Material handled has large bulk—loads are very heavy

Uniform controlled flow is required

Inclines are steep

Distances are relatively short

Many years of service and low maintenance are particularly desirable.

Hot or cold, free-flowing or lump, abrasive or non-abrasive—Rex Apron Conveyors move material at the smooth-flowing, closely controlled rate that saves you money . . . saves materials . . . saves time. When you have a conveying problem in your plant, call in a Rex Conveyor Engineer. He has had years of experience in solving difficult materials handling problems, and he's backed by a complete line of Rex Apron and Pan Conveyors. He will recommend without prejudice the exact type of conveyor which best suits your particular application. He'll explain in detail the advantages of Rex Design and Construction. For instance:

- ★ Unique outboard roller construction permits easy servicing without disassembling chain or conveyor. When roller replacement is necessary, only ⅙ as many operations are required as when rollers are between side bars.
- ★ Exclusive Rex Square Through-Rods seated in square holes in side plates positively cannot rotate. They last much longer.
- ★ Only a minimum of mechanical servicing is required.
- ★ Steep inclines are practical.
- ★ Power requirements are low because of large diameter outboard rollers.
- ★ Even for fine flowing material, leakage is held to an infinitesimal minimum.

***Want more money-saving facts?* They're as near as your telephone. Just call your nearest Rex Field Sales Engineer or write to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.**

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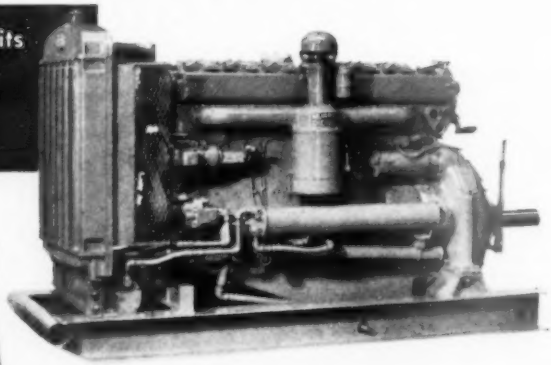
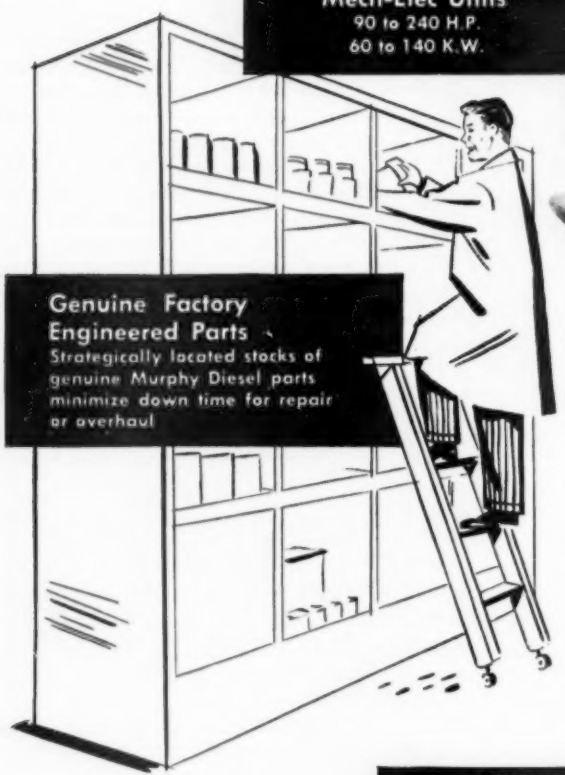
you will find MURPHY DIESEL
sales, parts and service facilities
convenient, prompt and dependable

Engines and Power Units
Generator Sets
Mech-Elec Units
90 to 240 H.P.
60 to 140 K.W.





Genuine Factory Engineered Parts
Strategically located stocks of genuine Murphy Diesel parts minimize down time for repair or overhaul

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Factory Trained Service Specialists
Dealer servicemen are trained in the newest and best service techniques right in the Murphy factory

MURPHY DIESEL

Heavy duty power for rock crushing

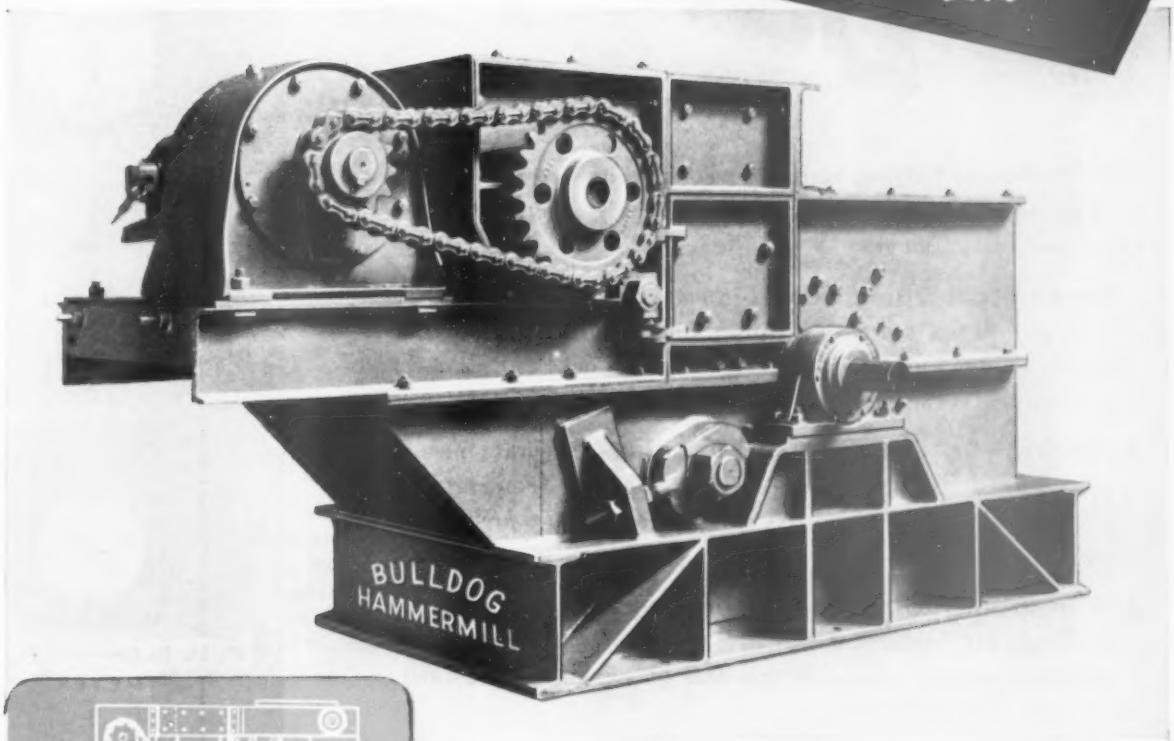
Murphy Diesel engines and power units are available in sizes from 90 to 226 H.P. Engine speeds are 1200 and 1400 rpm.

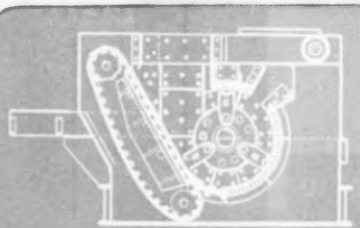
"Packaged" generating units are available with capacities ranging from 60 to 140 K.W. A.C. or D.C. voltages.

BULLDOG HAMMERMILLS

Assure Cement Plants.....

Twice the Capacity with 15 Times Longer Hammer Life*





Exclusive Traveling Breaker Plate Conveys Moist and Sticky Material to Hammers *Without Clogging* 1 to 1000 Tons Capacity

*ASK FOR PROOF OF MONEY-SAVING USES FOR PRIMARY, SECONDARY AND FINE REDUCTION

No hammermill offers as much production and operating efficiency as the BULLDOG! That's why operators who have checked them all know the BULLDOG'S exclusive non-clog feature of the Moving Breaker Plate reduces slow-downs and costly maintenance for high moisture materials. The Stationary Breaker Plate has no equal for dry materials. The BULLDOG Hammermill has the greatest hammer life of any hammermill. Write for Bulletin A today.

HAMMERMILLS, INC.

4700 WEST DIVISION STREET
CHICAGO 51, ILL. • SPaulding 2-9300

Subsidiary of PETTIBONE MULLIKEN CORP.

Now! "Self-Serve" Operation - Bailey Meter

Your "Self-Serve" Bailey controlled rotary kiln literally thinks for itself and reacts quickly and correctly to any changes in operating conditions. You get:

1. **Economical Operation**—*Gives maximum production from every unit of fuel you burn* because Bailey Combustion Control closely guards Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and Temperature of Air for Combustion.

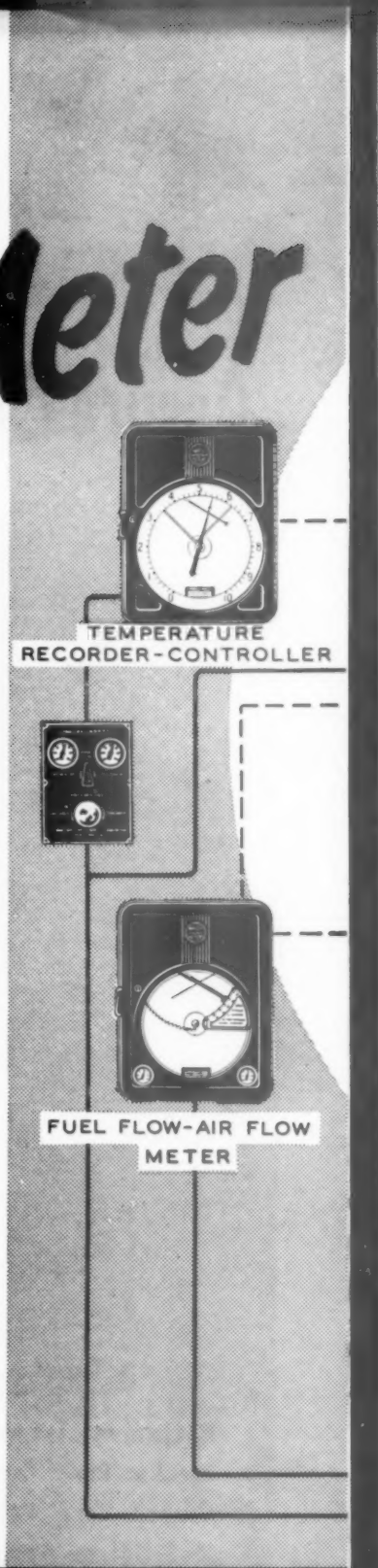
2. **Uniform High Quality of Product**—Accurate measurement and control of Kiln Speed, Burning Zone Temperature, Combustibles Content and Oxygen Content . . . *for a high grade product, consistently.*

3. **Minimum Maintenance**—Uniform excess air conditions and constant temperatures *prolong the life of your kiln.* Costly refractory repairs and wear and tear on auxiliary equipment are reduced to a minimum.

The accompanying diagram shows one way in which Bailey instruments and controls can give you a "Self-Serve" Kiln. Other arrangements to suit the requirements of any rotary kiln are available.

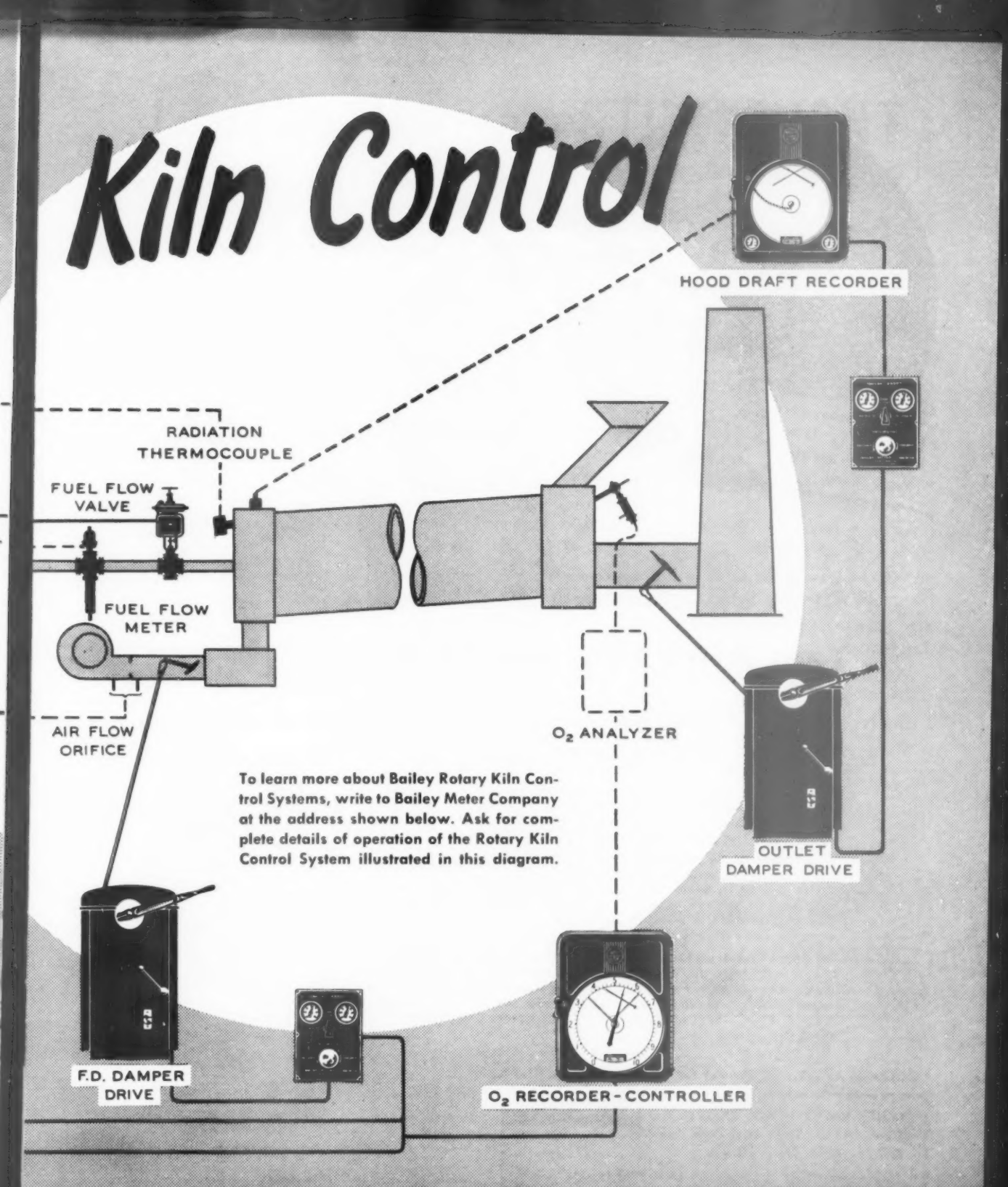
Bailey Meter Company maintains a staff of engineers who are experts in the control of rotary kilns. Let one of these men help plan a control system to give you a "Self-Serve" rotary kiln.

P-23



Bailey Meter Company

Kiln Control



To learn more about Bailey Rotary Kiln Control Systems, write to Bailey Meter Company at the address shown below. Ask for complete details of operation of the Rotary Kiln Control System illustrated in this diagram.

Meters and Control Systems for Process Plants

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Bailey Meter Company Limited · Montreal

"QUICK-WAY"

Reg. U.S. Pat. Off.

THE PIONEER TRUCK SHOVEL

has maintained World-wide

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Year After Year for 34 Years

Proven Design—*"QUICK-WAY"* from the very start has been built simple and extra rugged—each part made of the finest steel to carry a big extra margin of strength. Constant improvement in design application and engineering has made *"QUICK-WAY"* better year after year—a machine that *lasts longer,* with *less down time and more profits for the user.*

4 Models—In *"QUICK-WAY"* you have your choice of four models. Model L—1/2 cubic yard, 10 ton crane. Model E—4/10 cubic yard, 7-1/2 ton crane. Model S—1/3 cubic yard, 5 ton crane. Model J—1/4 cubic yard, 3 ton crane. For Standard Trucks and Special Carriers.

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Pulverizing Machine for Reducing Materials to Micron Sizes

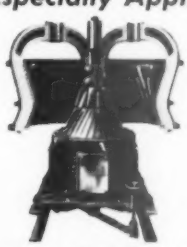
A fluid jet pulverizing machine, the Sturtevant *Micronizer* speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired.

Sturtevant *Micronizer* mills are used throughout industry for reducing non-metallic and metallic minerals and ores, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes, and numerous other organic and inorganic products.

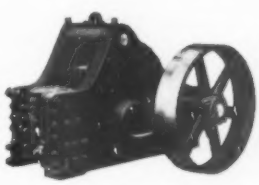
Sturtevant *Micronizer* pulverizers are available in many sizes and capacities. Write for information.

Other Sturtevant Pulverizing Equipment for Rapid Reduction of Materials...

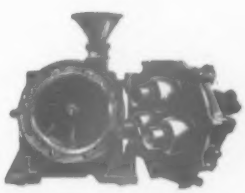
Especially Applicable for Initial Grinding of Products for the Micronizer Mill



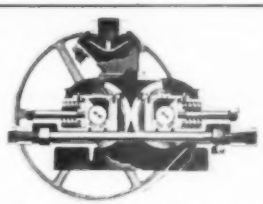
ROTARY FINE CRUSHERS for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



JAW CRUSHERS for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.



RING-ROLL MILLS for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



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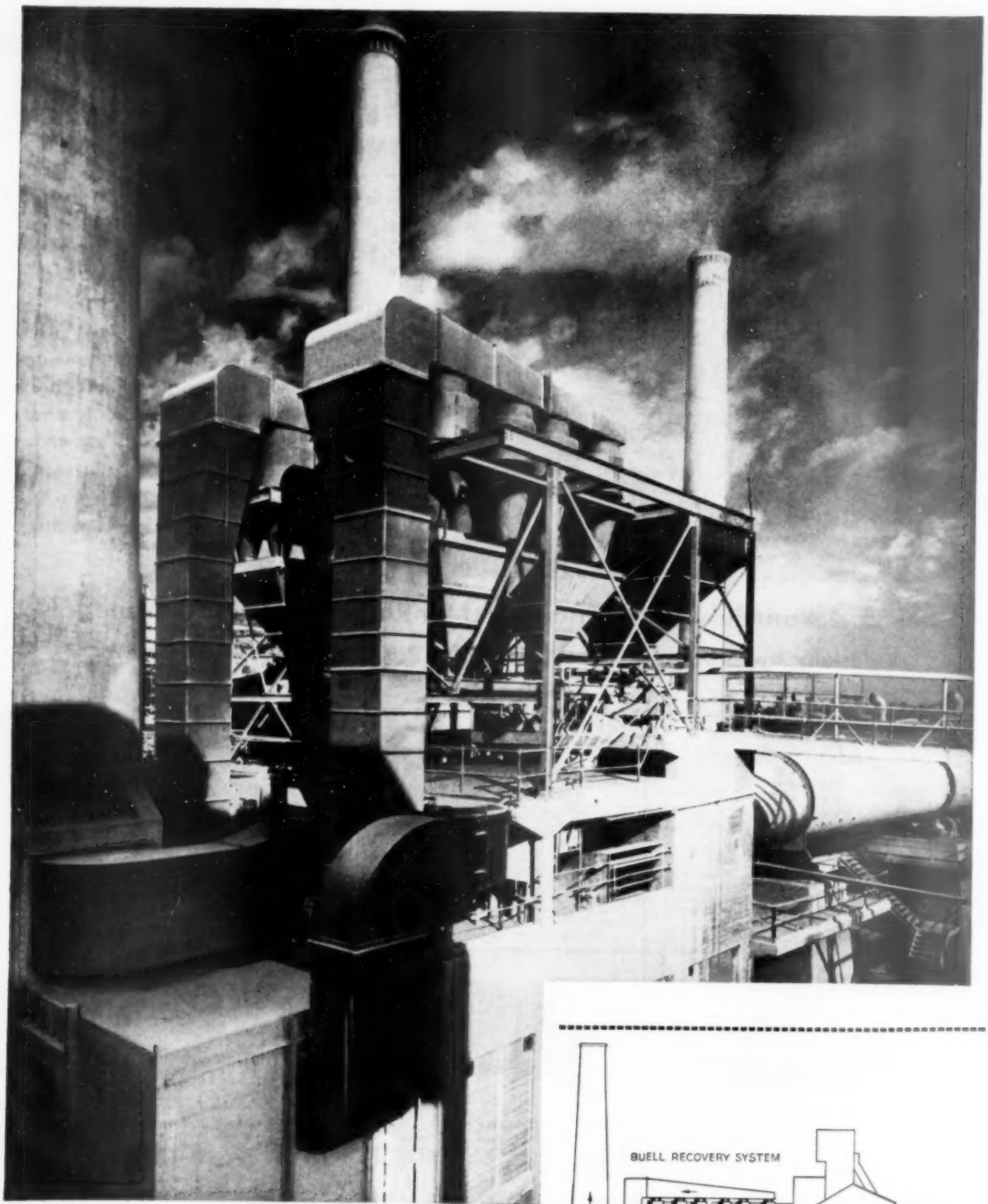

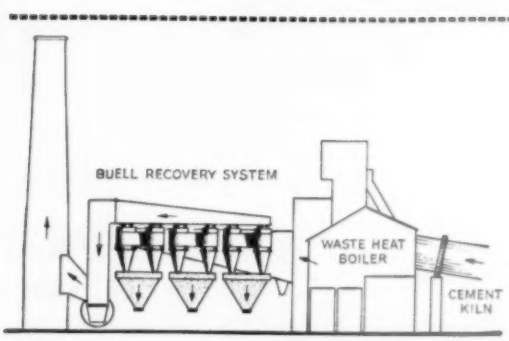

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Buell Recovers More Dust

High Cyclone efficiency ... with the exclusive 'Shave-Off'... fits hand in glove with industry needs. Loss in the gas outlet consists mainly of alkalis, permitting the cement dust to be returned to kilns without any interruption to manufacturing operations.

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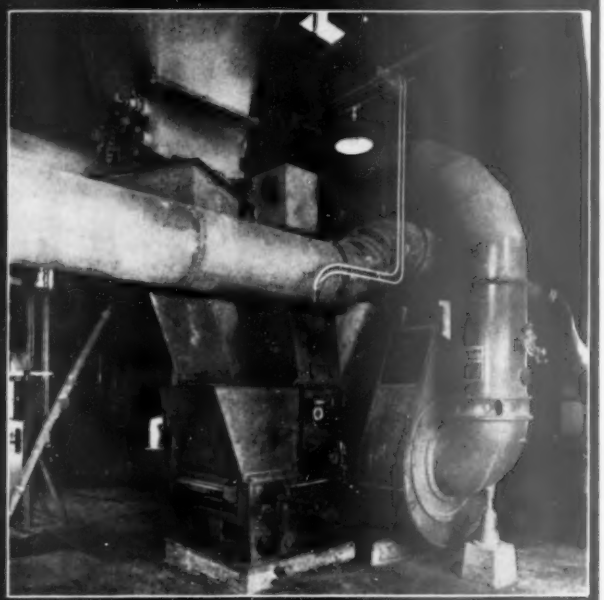

Direct-firing with coal. Pulverizer for 2nd kiln in background, left.

FOR THOSE LIME-CEMENT PRODUCERS

whose plants are *so favorably located,* conversion to natural gas-firing is a "matter of minutes," figuratively speaking. When that fuel becomes available, as pictured above, the first section of burner pipe (elbow) can be removed from fan outlet, and combustion air delivered to the kiln-hood from forced-draft fan . . . out of the picture to the right. GAS SUPPLY HOSE, not visible here, runs behind primary air pipe toward the left. Some of our customers whose gas supply is seasonal . . . or on a "dump" basis . . . have used our pulverizer fan for supplying primary air, after removing fan blades from pulverizer rotor. STRONG-SCOTT PULVERIZERS are readily adaptable to combustion chambers ahead of rotary rock, shale, or coal driers, and waste-heat boilers.

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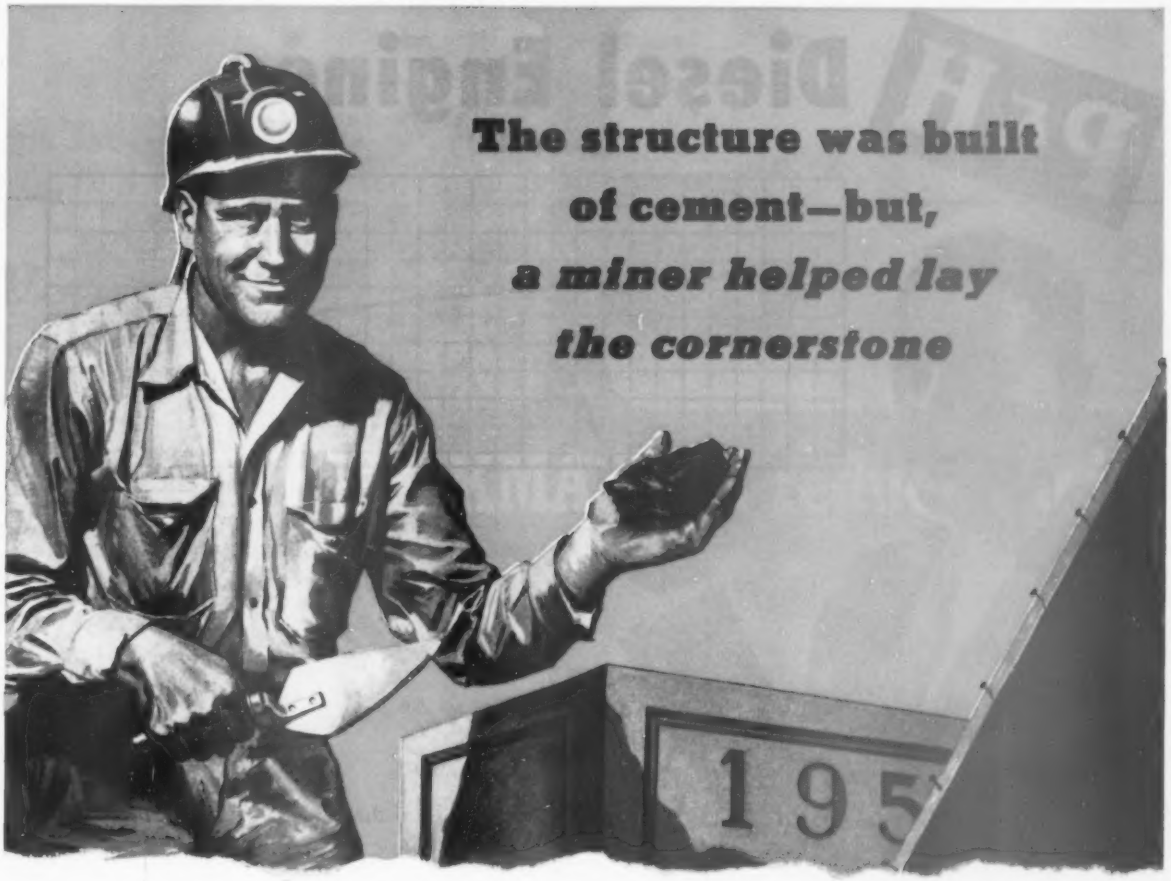

● Converting the raw building products provided by Nature into the rugged and beautiful works of man requires both vision and skill. It also requires *fuel*—the unseen factor behind every towering structure. Selecting the *right* fuel is important.

Along the Baltimore & Ohio are vast deposits of bituminous coal with structure and volatility ideal for producing cement, lime, and brick. Modern mechanization and the easy accessibility of the mines keeps production and transportation costs low. And because coal can be stored anywhere, the need for expensive facilities is eliminated.

We will be glad to advise you on the right kind of coal for your specific need, show you where to find it, and how to burn it. The modern efficiency, economy, and cleanliness of Bituminous will amaze you. *Ask our man!*

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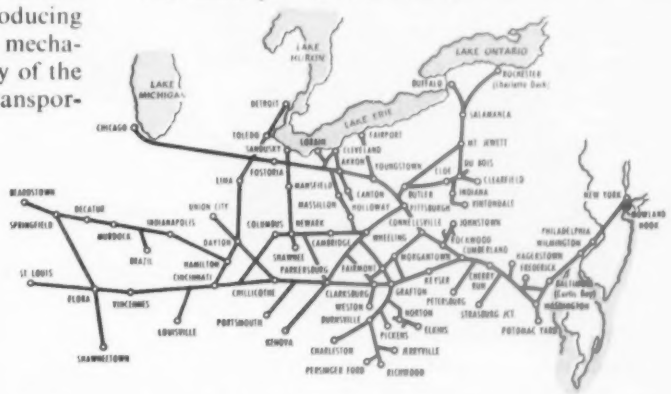

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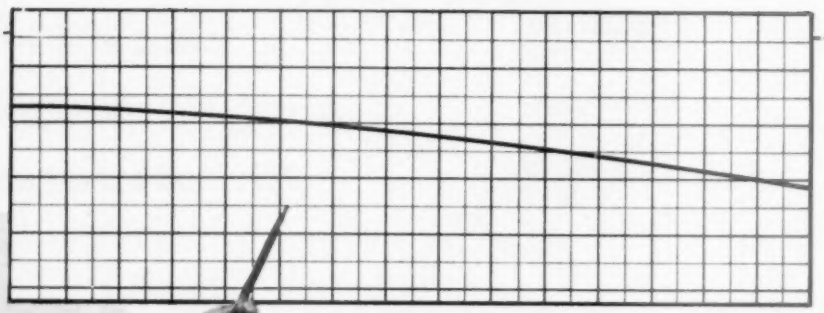
P&H Diesel Engines

(2-CYCLE)



Can your diesels match this torque curve?

This is the torque curve for the P&H Model 687-C Diesel Engine. Note how the torque characteristics are sustained throughout its entire horsepower range.

That means steady, responsive power at all speeds — greater lugging "ability" for those toughest jobs. It's the kind of unfaltering performance that assures more profits in any service, constant or intermittent.

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P&H Diesel Engines are built in 1, 2, 3, 4 and 6-cylinder models — up to 145 h.p.

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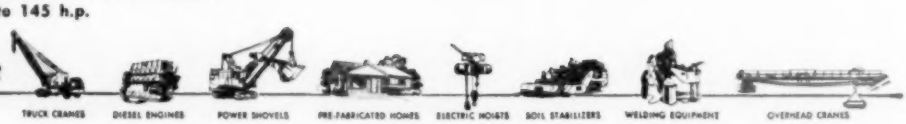

Here's how ROCKMASTER® reduces noise

The noise your neighbors hear . . . and complain about . . . is air blast. It is the noise of wasted explosive energy that escapes into the air before it has done its job on the burden. Such noise is difficult to avoid when holes are spaced too closely and detonation begins at the top. This waste of power occurs because the explosives force seeks the path of least resistance.

By allowing initiation at the bottom of the holes, the ROCKMASTER Blasting System can keep the explosives force under prolonged confinement . . . as shown in the above photos taken at the height of four different ROCKMASTER blasts. Each photo shows considerable movement of burden with practically no escaping gases.

To see how the ROCKMASTER Blasting System can improve your blasting efficiency and reduce noise at the same time, send for your copy of the booklet, "Quarry Blasting the ROCKMASTER Way."

The North Jersey Quarry Company erected this greenhouse at its Millington operation, 400 feet from the working face, to prove that its blasts don't break windows. The reduced noise and vibration of the ROCKMASTER *system helps them improve community relations.*

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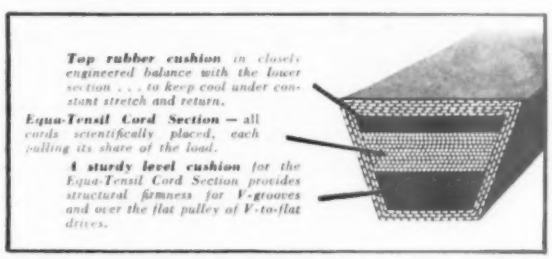
You can be sure there will be no slipping on the drive when you use a U. S. Rainbow V-Belt. Straight sidewalls grip the grooves the full height of the belt, providing the complete contact which results in much greater pulling power and eliminates slippage.

Every ounce of excess stretch has been worked out mechanically before leaving the factory, yet the belt still remains sufficiently elastic to withstand heavy shock loads.

Every U. S. Rainbow V-Belt has the extra advantages of the unique Equa-Tensil Cord Section—a scientifically developed "U. S." construction that brings together in a balanced unit the concentrated strength of the multiple pulling cords, distributes the pulling of the load so evenly among the cords that each carries its full share. The U. S. Rainbow V-Belt absorbs shocks with ease and still retains a sturdy no-slip grip.

Order from your jobber, or contact any of our 25 District Sales Offices, or write to address below.


Top rubber cushion in closely engineered balance with the lower section . . . to keep cool under constant stretch and return.
Equa-Tensil Cord Section — all cords scientifically placed, each pulling its share of the load.
A sturdy level cushion for the Equa-Tensil Cord Section provides structural firmness for V-grooves and over the flat pulley of V-to-flat drives.

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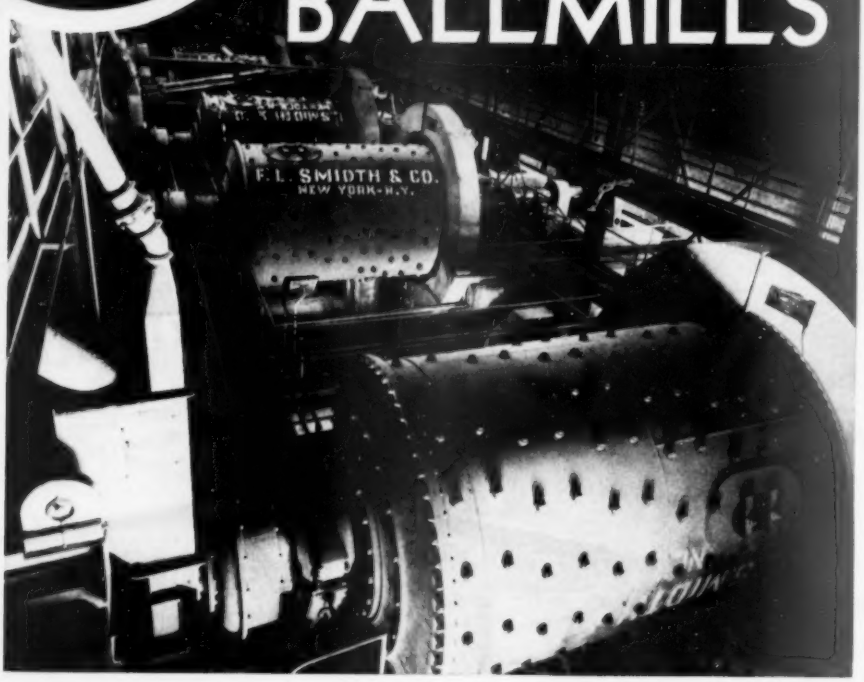

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"WE HEAR..."

August, 1953

Options have been acquired on 11 abandoned rock quarries near Bethlehem, Penn., by Esso Standard Oil Co., for the purpose of storing home-heating oil during off-season periods. The oil will be piped 50-70 miles, from a Bayway, N.J., refinery to the quarries and returned to the Atlantic coast market when demand reaches its peak. The stored oil will float on water, with the level of the oil controlled by pumping water in or out at the bottom of the quarry.

* * * * * * * * * *

An eastern sand and gravel corporation, after a recent drowning on its property, has taken steps to prevent children from using the ½-sq. mi. pit as a "swimming hole." A watchman has been assigned to guard the pit and access road during daylight hours, and "keep-off" signs, which had been torn down by swimmers, have been re-posted.

* * * * * * * * * *

A zoning controversy in Concord, Calif., has resulted in the issuance of an order by the city council that the owners of a ready-mixed concrete plant must cease operations and dismantle the plant. The city charged that the plant was not in an industrial zone. An agreement has been drawn up, however, which permits both wholesale and retail transit-mix deliveries to be made for the balance of this year. The contract specifies that operations must cease by January 1, and the plant, which must be dismantled by February 15, shall not be relocated in the city except in the proper zone. A $5000 surety bond was posted by the owners to insure faithful performance of the obligations under the contract.

* * * * * * * * * *

According to a joint report by the U.S. departments of commerce and labor, expenditures for building activity reached the highest level on record in the first six months of 1953. Even allowing for higher costs, more building is being done than ever before, including the construction upsurge in World War II. Construction expenditures, up to July 1, had reached peak levels in every month, with the 6-month total amounting to $16,000,000,000, about 8 percent above the same six months of 1952. Total private outlay amounted to $10,900,000,000 including record expenditures for new homes, commercial facilities and public utilities. Public or government financed construction totaled $5,100,000,000, or 7 percent above that of 1952. Highway expenditures of $1,200,000,000 were at the highest level in history. Private outlays for industrial plant construction have declined slightly during the last few months, but the 6-month total of $1,200,000,000 was still nearly equal to that of a year ago. Residential building is expected to continue high during the next year, due to relaxing of government regulations on down-payment requirements.

* * * * * * * * * *

A proposed local ordinance licensing and regulating sand and gravel and topsoil-removal operations was recently voted down by the Chenango, N.Y., town board following a public hearing in which the measure was assailed by sand and gravel producers and other affected persons. The ordinance, if passed, would have required sand and gravel operators to file plans prepared by licensed engineers or surveyors, to obtain a town license at a minimum fee of $200, file a $200 bond, obtain a certificate from county and town highway superintendents, observe certain other regulations, and to refill all excavations with "non-burnable" fill. The stated aims of the proposed ordinance reportedly were to safeguard life, prevent topsoil stripping and to eliminate health hazards caused by stagnant pools.

* * * * * * * * * *

A new shipping record was established by Michigan Limestone Division of United States Steel Corp., in May, when it shipped 2,157,000 tons of limestone from its Rogers City calcite plant, which was approximately 100,000 tons more than the previous record established in October, 1952.

WE HEAR

Among numerous reports recently received about skulls, bones, skeletons and other relics of the past being unearthed during mining and excavating operations, was one from Thorstenberg & Tamborello Gravel Co., near La Grange, Texas, which reported the unearthing of the skeleton of a "huge" man, believed to have been buried hundreds of years ago. Identification of the skeleton has not been made, but it is not believed to be that of an Indian as pieces of cedar from the casket were found and it was not Indian custom to bury their dead in cedar caskets. The skeleton will be given to the University of Texas.

* * * * * * * * * *

An approximate 4000 tons of Russian potash, produced behind the "Iron Curtain" in the large potash mines of eastern Germany, reportedly were sold in the United States to a farmers' "co-op" in exchange for a shipment of tobacco. This is the second such transaction reported. Previously an eastern fertilizer company had taken 10,000 tons of Russian potash in exchange for machine tools. Alarmed U.S. potash officials have expressed a fear of imported Russian potash and a Washington Congressional committee is currently investigating the effect of Russian potash imports on the American market.

* * * * * * * * * *

In a recent issue of "Limeographs" it was stated that entomologists of the Department of Agriculture have reported that chemically treated calcium carbonate (probably precipitated calcium carbonate), when mixed with organic insecticides, produces improved insecticidal dusts. The mixtures are said to have good dusting qualities, giving a free-flowing dust cloud and good coverage of plants in field tests. Also, laboratory tests were said to indicate the product stores well under moist conditions.

* * * * * * * * * *

An eastern wire-rope manufacturer is now producing rope that is marked at 5-ft. intervals with colored bands for easy measuring. Since wire rope is shipped to a job on large reels and is usually coated with a protective compound, users previously had to lay it along the ground or factory floor for measuring. Sand and grit picked up by the rope tended to make it fray much quicker. The new marked rope eliminates this trouble, as well as saving considerable measuring time.

* * * * * * * * * *

Construction contract awards in the 37 states east of the Rockies, for the first six months of 1953, despite a downward trend in June, were still 2 percent higher than for the first six months of 1952, according to an F. W. Dodge Corp. report. Nonresidential awards totaled $2,952,031,000, or 9 percent over the 6-month, 1952, period; residential awards of $3,258,496,000 were down 3 percent from 1952; heavy engineering awards (public works and utilities) of $1,697,311,000 were down 1 percent. Total awards for the month of June amounted to $1,210,509,000, which was a 25 percent decrease from May, and 19 percent lower than in June, 1952. Nonresidential awards in June, 1953, were 21 percent lower than in May and 17 percent less than in June, 1952. Residential awards decreased 27 percent from May and 20 percent from June, 1952, while heavy engineering was 25 percent lower than in May and 19 percent below June, 1952.

* * * * * * * * * *

Another fatal injury, due to lack of safety precautions, has been reported in the rock products industries. A western gravel plant employe died of a skull fracture and brain concussion he received when his clothing caught on a revolving driveshaft as he reached across it to remove trash from a conveyor belt, without first shutting off the machinery.

* * * * * * * * * *

Neosho County, Kan., is opening a new stone quarry near Erie, Kan.—just another instance of government competition with private industry.

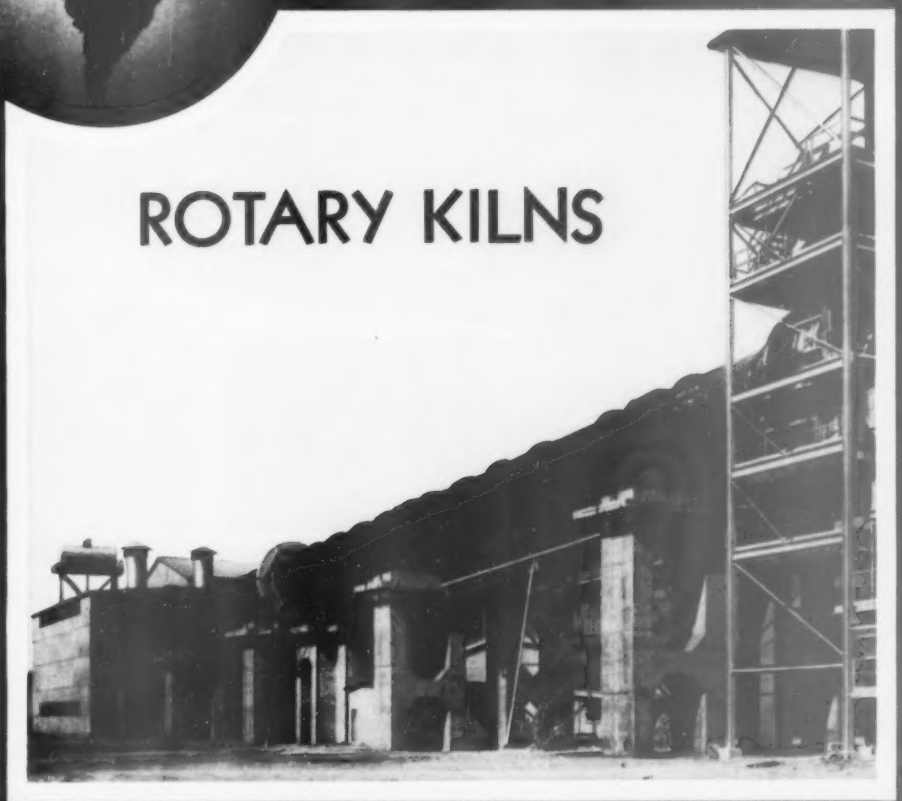
* * * * * * * * * *

A truck-tax bill has been introduced into the Ohio State Legislature. The tax, which will apply to many out-of-state trucks as well as Ohio trucks, is based on an axle-mile levy which will be collected from the owners of all trucks with three or more axles, operating on Ohio highways. The tax will range from a half-cent a mile for 3-axle trucks to 2½ cents per mile on trucks with five or more axles. Coupled with the truck tax is a penny-a-gallon increase in gasoline and diesel fuel taxes. Other states having ton-mile or weight-distance truck taxes include New York, Oregon, Wyoming, Kansas, Colorado and South Carolina. Several other states have variations of these taxes or special truck levies.

THE EDITORS

SMIDTH

ROTARY KILNS



Smidth machinery has been supplied to over 70 countries of the world including 1000 rotary kilns and 5000 grinding mills, plus auxiliary machinery such as coolers, agitators, washmills, pumps, conveyors, packers, separators, etc. for use in Cement, Lime and Ore plants.

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Remove TOUGH CLAY, SOFT ROCK AND OTHER REFUSE FROM any material!

TYPICAL INSTALLATIONS OF McLANAHAN LOG WASHERS

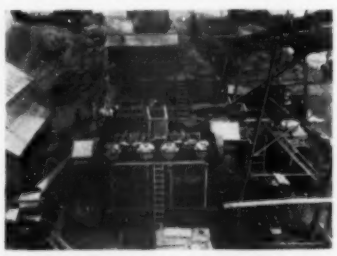
Three pairs of McLanahan Logs in the world's largest phosphate plant in Florida.

New and old type McLanahan Log Washers used here remove clay from cement rock in Pennsylvania.

McLanahan Log Washers removing tough clays from gold ores in Alaska.

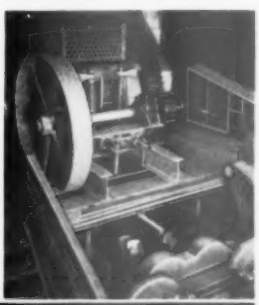
McLanahan Paddle Mill and Log Washer cleaning Texas limestone.

McLanahan Welded Steel Log Washers are smooth running, highly efficient machines for removing tough clays, soft rock and other materials from iron and manganese ores, barytes, zinc, ochre, peat, limestone, trap rock, sand and gravel, phosphate, gold and other ores. These machines remove up to 90% of refuse materials—providing savings that more than pay for the installation in a short time. A few of hundreds of applications are illustrated at right.



Two pairs of 30' McLanahan Logs, used for cleaning sand and gravel in Virginia.

McLanahan Rockmaster Crusher and Log Washer removing tough clays from iron ore in Alabama.



Write today for Bulletin WLO 849

McLANAHAN & STONE CORPORATION
Pit, Mine and Quarry Equipment Headquarters
Hollidaysburg, Pennsylvania

Dependable Products: **Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.**

UNITED PRESS PHOTO

BUILDING WITH EXPLOSIVES

Hoover Dam is an outstanding example of the many large construction projects which Hercules explosives have helped to build. The use of explosives on such projects calls for thorough understanding of the rock formation, selection of the correct explosives to shoot the rock, and adequate facilities to supply explosives on schedule. Our Contractors Division has complete technical and cost data on the use of explosives in any type of construction. Hercules also has service facilities to help you in solving mining, quarrying, and petroleum problems involving explosives.

HERCULES POWDER COMPANY

Explosives Department, 946 King Street, Wilmington 99, Delaware

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.

XR53-3

Like all PIONEER jaw crushers, the 42" x 48" has an all-welded steel base of double-wall, box-type construction. Design reduces weight, but strength is substantially greater than is possible with a cast steel base of the same dimensions.

Hydraulic process uses oil pressure to expand inner races of shaft bearings. This permits bearings to slide freely from shaft so that bearing check-up and maintenance become relatively simple. Shaft is 10' long, 14½" in diameter between bearings. Shaft stroke is 1¼".

Giant New Jaw Crusher Rated to Deliver Over 600 TPH at 13" Setting

Workmen are dwarfed by the 19,000 lb. pitman and 5200 lb. shaft assembly being lowered into place as PIONEER assembles the world's largest overhead eccentric jaw crusher. This 42" x 48" crusher reduces rocks in a 4 cu. yd. crushing chamber at a calculated capacity of over 600 tph with maximum jaw setting of 13". Minimum setting is 4". Length of moving jaw is 104"; stationary jaw, 90". Crusher was designed to reduce drilling and blasting costs.

Welded steel construction of the base allows crusher to be built with a total weight of less than 95,000 lbs. These features are important in preventing excessive maintenance cost: A patented closure between inner and outer bearings which makes it possible to place bearings closer together than on any other anti-friction bearing jaw crusher . . . thus greatly reducing shaft strain. Outer bearings saddle-mounted in the frame on precision-machined parts. Split-reversible jaw plates, cast from tough, alloyed manganese steel, designed to prevent cold flow and peening. Toggle plate safety device protects crusher when non-crushable material enters chamber.

Want the production reports on how this giant crusher can cut operating costs for cement and lime producers? Write now to

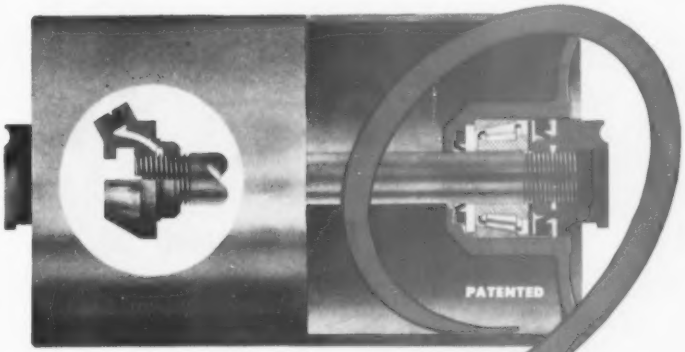
Pioneer ENGINEERING WORKS, INC.
Minneapolis 13, Minnesota
(SUBSIDIARY OF POOR & COMPANY, CHICAGO)

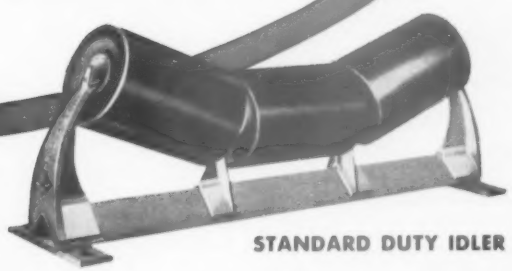
Ready to go. Giant crusher is ready for shipment to the U. S. Lime Products Corp., Las Vegas, Nevada. Two-unit base permits easy handling by standard equipment.

NEW UST* Continental Idlers

* UNIT-SEALED PRE-LUBRICATED TIMKEN BEARINGS

Saves Grease!
Saves Labor!
Saves Belts!





STANDARD DUTY IDLER

- UNIT-SEALED
- PRE-LUBRICATED
- TIMKEN BEARINGS

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

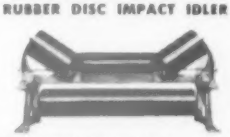
The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler without relubrication for 1-2-3 years depending upon the severity or character of conditions.

Write for Bulletin R.P.-116

SELF-ALIGNING FLAT BELT IDLER

RUBBER DISC IMPACT IDLER



GRAIN CONCENTRATION IDLER

SELF-ALIGNING TROUGHING IDLER

Long Life- THE ULTIMATE IN MINIMUM MAINTENANCE

CG—5209

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

Don't Stick Your Neck Out!

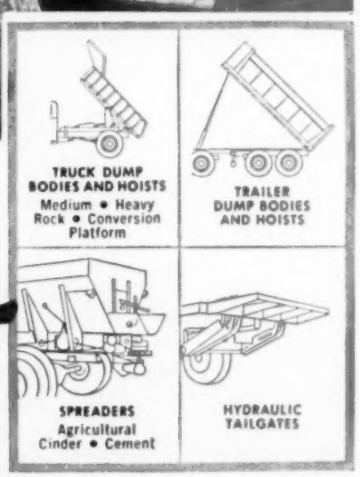
New Hercules Front Mounted Telescopic Hoist Gives You 1000 lbs. Extra Legal Payload

You can haul an extra half-ton of payload FREE on every trip by choosing the sensational new HERCULES Single Telescopic Hoist (Model 1210) for your heavy-duty dump truck bodies eleven to fifteen feet long.

This 20-ton capacity hoist pays for itself quickly because it weighs so much less . . . shifts more load to front axle . . . reduces driver cost per ton . . . and minimizes maintenance. Available for single or tandem axle straight trucks, Model 1210 mounts easily, no part extending below the truck frame.

For larger capacities, HERCULES builds Twin Telescopic Hoists with even greater payload-boosting advantages.

Act now to increase your profits. Write, wire or phone for complete information.


TRUCK DUMP BODIES AND HOISTS
Medium • Heavy Rock • Conversion Platform
TRAILER DUMP BODIES AND HOISTS
SPREADERS
Agricultural Cinder • Cement
HYDRAULIC TAILGATES

Hercules

buy from the line of strongest design

HERCULES STEEL PRODUCTS CORPORATION • GALION, OHIO

How many hundred dollars will this ad save you?

Both K-2 and K-4 links are shown at the left. When wide buckets are used, Kensington's special 4-hole K-4 makes it possible to use one strand instead of two . . . *and that single KENKROME chain will be stronger than two ordinary No. 844 chains!*

How much do you spend each year to replace elevator chains and sprockets?

Be sure to include the labor needed to make each change. And don't forget loss in production while your plant is shut down for repairs.

Now figure the money you'd save by using a chain that outlasts ordinary chains 2 to 4 times. That's what you can expect from the improved KENKROME No. 844 Heavy Duty Elevator Chain shown above!

KENKROME is no ordinary steel . . . in fact it's no ordinary manganese steel. There's no other steel quite like it.

Addition of special alloying metals under a patented process, plus Kensington's own scientific method of heat treatment, have created this remarkable metal which defies wear by developing surface hardness under impact to better enable it to withstand abrasion. Beneath this continually hardening surface, the metal always remains tough . . . better able to withstand shock than are metals that are hard all the way through.

But Kensington's wear-conquering engineers didn't stop with development of the metal itself. They redesigned the physical characteristics of the links. Note, for example, how the extra-heavy 1¼" pin is held in place. Even in those rare instances when a pin *does* break, it can't fall out, for on one end a cotter pin fits over its head, and on the other, a cotter pin passes through both pin and extended boss. Pins have T-head so they may be reversed. They fit link holes that are drifted to close tolerances. Links are extra heavy . . . heavier than in any other No. 844 built.

The Renewable Tooth Sprocket is another example of Kensington's improved design. Tooth segments can be replaced by two men during lunch hour . . . without even removing the chain! And a new set of teeth costs but a fraction of what you'd pay for a complete one-piece sprocket.

KENKROME Chains and Sprockets are built to fit all standard conveyors and elevators used in rock, gravel, and cement plants. It will pay YOU to *Switch to KENKROME!*

To find what it will cost, just fill in and mail the coupon. You'll be under no obligation.

Other wear-resisting alloyed ORO manganese replacement parts

Elevator buckets that last longer, seldom need replacing.

Crawler treads for all sizes and types of shovels and draglines.

Replacement parts for roll and jaw crushers, ball, rod, tube, hammer mills.

Crawler sprockets for most shovels and draglines.

Kensington STEEL COMPANY

KENSINGTON STEEL CO., Dept. R, 505 Kensington Ave., Chicago 28, Ill.
SUBSIDIARY OF POOR & COMPANY • CHICAGO

☐ Please quote prices ☐ Please ask salesman to call

Chain Information { CHAIN NO. TYPE LENGTH ATTACHMENT NO. (OR 2 BOLT PINS) SPACED EVERY PITCH

Sprocket Information { CHAIN NO. NO. TEETH SHAFT DIA HUB LENGTH ☐ CENTRAL ☐ KEYWAY ☐ OFFSET ☐ BUSHED

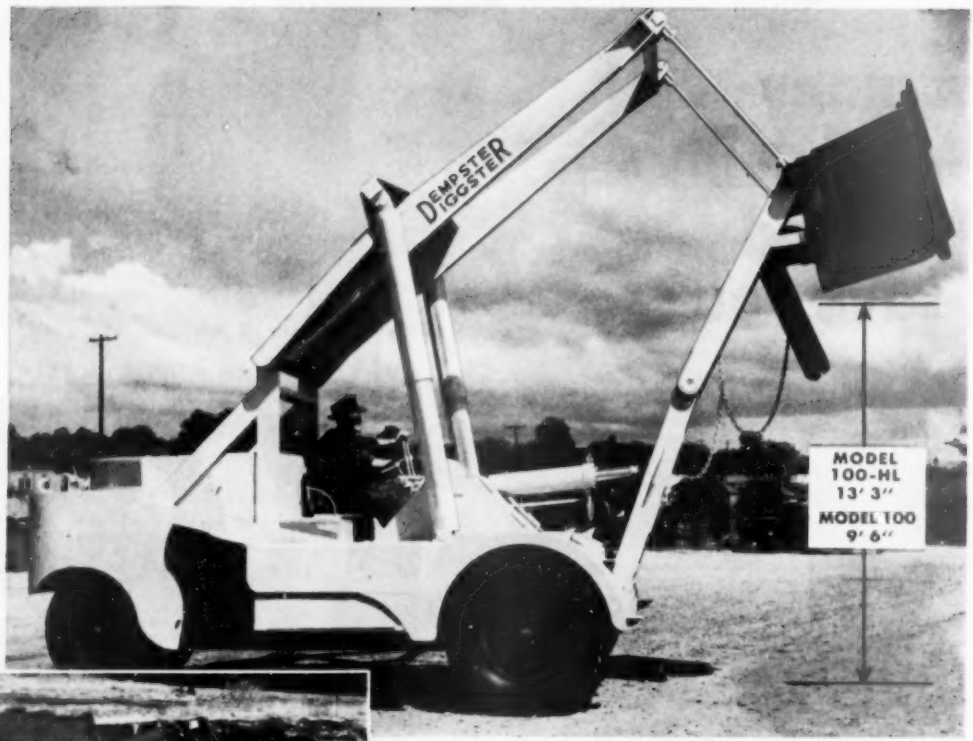
NAME

COMPANY

ADDRESS

CITY ZONE STATE

Power-Packed 100% Hydraulic Performance



Large photo shows position of bucket when at extreme height above ground. Two small photos illustrate how, in excavation or loading, bucket follows slope of material—getting a full bucket with every stroke. Dempster-Diggster digs-in 15 inches below grade and digs out a 15 to 18 foot bank.

DEMPSTER-DIGGSTER OFFERS YOU BIG SHOVEL HYDRAULIC PERFORMANCE IN A SMALL, MOBILE UNIT...

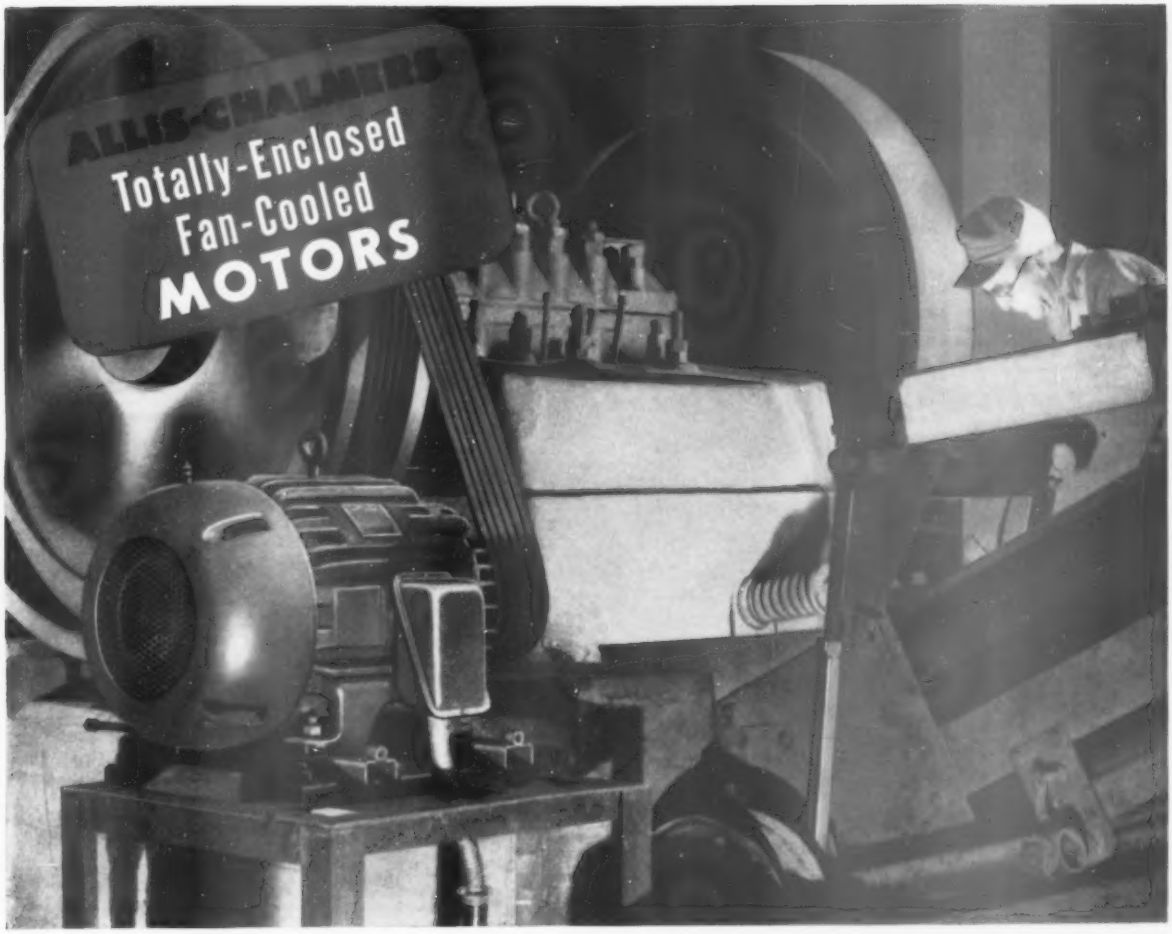
The Dempster-Diggster is the only small shovel that offers you all these basic and important features of big shovels—*Simultaneous and Independent Crowd and Hoist . . . Hydraulic Crowding . . . Hydraulic Hoisting . . . Variable Crowd Action at any Dipper Position . . . Changeable Buckets.*

With these big shovel features, plus truck speeds on the job, and to and from jobs, the Dempster-Diggster enables you to speed up production for greater profits on jobs requiring excavation or loading!

Write for complete facts on this revolutionary, power-packed shovel. A product of Dempster Brothers, Inc.

DEMPSTER DIGGSTER
TRADE MARK REG

DEMPSTER BROTHERS
383 N. Knox, Knoxville 17, Tennessee



Get These 3 Low Maintenance Features

1 Wide Open Air Flow

No enclosed external air passages to clog. Easy to clean with cloth, brush, air hose or vacuum. Simply remove fan cover and whole radiating surface is exposed for inspection and cleaning.

2 Cast Iron Construction

Frame, conduit box and fan cover of cast iron resist corrosion. Fan is non-sparking, corrosion-resistant material. Well suited to outdoor operation.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

3 Pre-lubricated Bearings

Ball bearings are double-shielded type, pre-lubricated at the factory. Periodic lubrication is not required under normal operating conditions, but provision is made for in-service lubrication if necessary.

GET COMPLETE INFORMATION on Allis-Chalmers motors for indoor and outdoor service — complete with Allis-Chalmers coordinated control — from your nearby A-C Authorized Distributor or District Office, or write for Bulletins 51B7286 and 51B7149. Allis-Chalmers, Milwaukee 1, Wisconsin.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

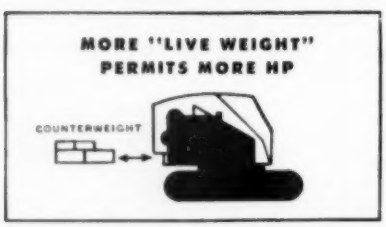
A-4038

Before you buy:

COMPARE NET HP!

This LS-85, despite tough, big-chunk rock, has been operating over 1200 hours without requiring one replacement part!

Don't judge available power by engine model only ... NET hp is what adds up to extra profit!



COMPARE shovel-cranes with and without counterweight. That test spotlights the size, weight and heft built into the working parts and structural members. You'll find the LS-85 has more "live weight" than comparable ¾-yard shovel-cranes.

Greater net horsepower assures faster, deeper digging. Bigger loads are handled without stalling. For example: the diesel driven heavy-duty ¾-yard LS-85 packs 92 net hp. That's more power than comparably-sized competitive rigs can safely use. It's why the LS-85 has more digging force behind its bucket teeth . . . why it cuts so smoothly . . . hoists and swings without a pause.

Use of greater net hp is practical because of all-welded, stress-relieved construction *and extra "live weight."* This *extra live weight* is in heavier, sturdier working parts and structural members—rather than a heavier counterweight. All this means year-after-year service and low maintenance costs. So whatever you do, don't compare power by the engine model only—CHECK *NET* HP.

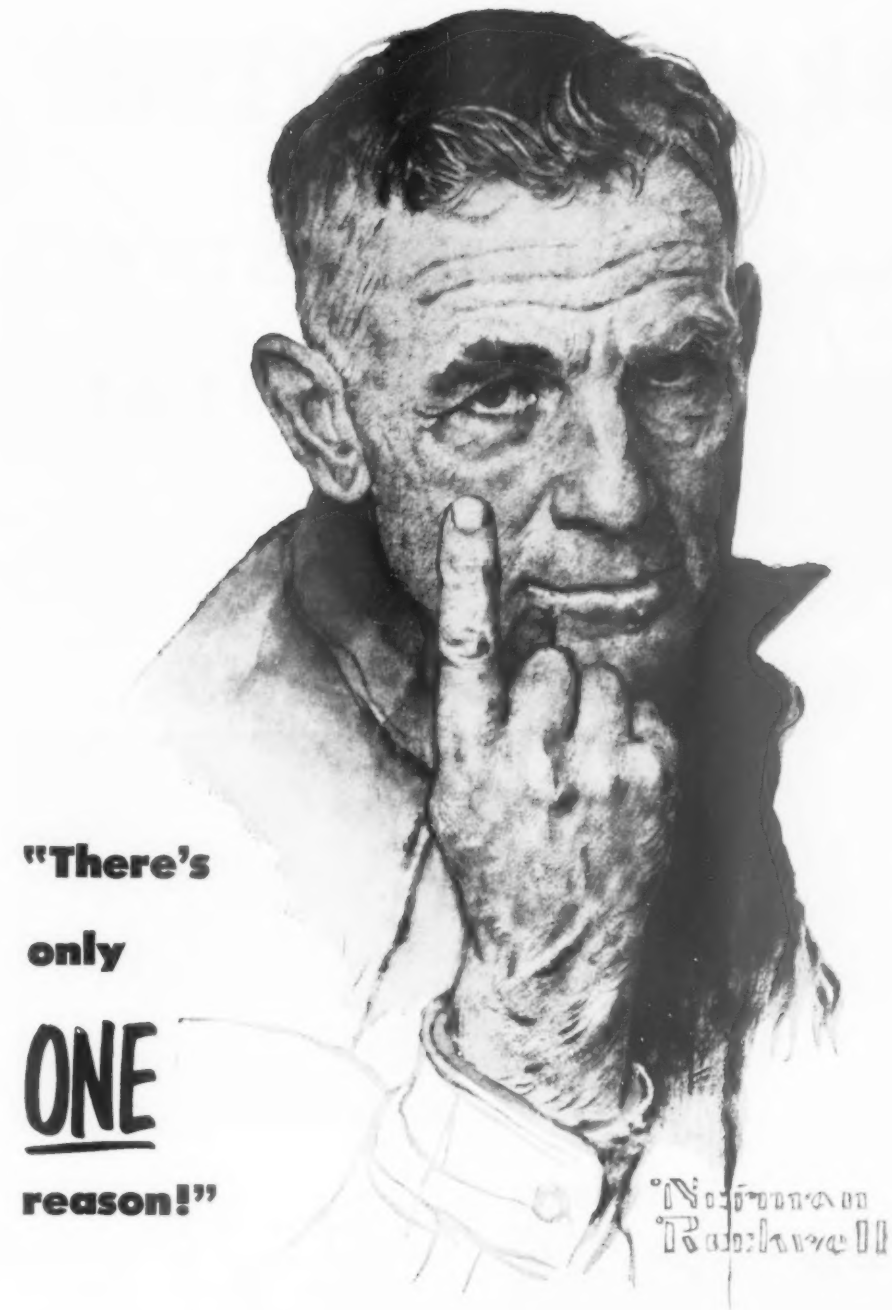
For more facts on the LS-85, ask your distributor, or write for Catalog 2317. For the complete line, request Catalog 2373.

LINK-BELT SPEEDER CORPORATION
Cedar Rapids, Iowa

12.248

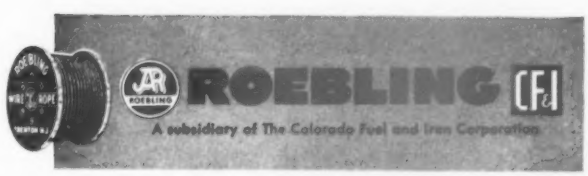
LINK-BELT SPEEDER
CORPORATION
BUILDERS OF A COMPLETE LINE OF CRAWLER, TRUCK AND WHEEL-MOUNTED SHOVEL-CRANES

FACTORY-TRAINED DISTRIBUTOR SALES AND SERVICE SPECIALISTS ...*EVERYWHERE*



IT'S JUST THAT SIMPLE. There's only one reason in the world why so many wire rope users in the quarries prefer Roebling wire rope . . . *it costs a lot less on the job than any other.*

For maximum wire rope efficiency and economy, call your nearest Roebling office for a Field Man. He'll recommend the best ropes for your requirements.

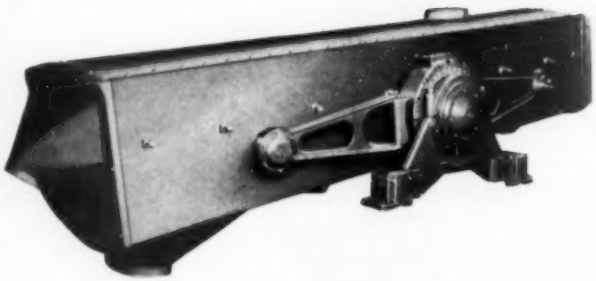


JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

VIBRATING SCREENS

FOR

The CEMENT INDUSTRY

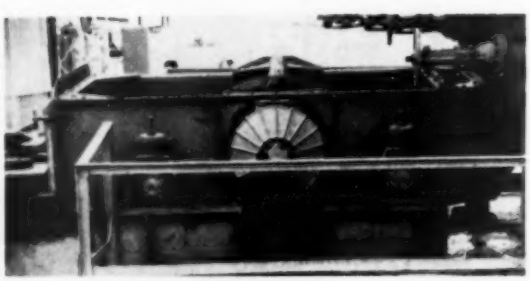


SELECTRO SCREENS

For Scalping Cement ahead of valve bag packers and cement pumps to remove foreign matter. For efficient sizing operations. A four bearing positive eccentric screen. Adjustable both as to stroke and pitch.

GYROSET SCREENS

For scalping and for raw material sizing. A rugged two bearing positive eccentric screen. Adjustable as to stroke from 0 to 3/8" for efficient economical service.



For slurry scalping, or any type washing or de-watering operations. Simple construction yet flexible in action. Size ranges from 18" to 72" in width and 4' to 16' in length.

PRODUCTIVE EQUIPMENT CORP.

2926-28 W. LAKE ST. CHICAGO 12, ILL.

OWEN
The Universally Popular BUCKETS

TYPE "D"
HEAVY DUTY BUCKETS

For severe service in excavating and dredging hard materials. Heavier and more rugged than Type "M" with longer and larger lower arm bearings. Sealed from grit.

Type "DX"

Still heavier than "D" with extra large shafts and bearings. For dredging and the severest kinds of excavating.

TYPE "M"
GENERAL PURPOSE BUCKET

Primarily for excavating but efficient in handling compact materials, large crushed rock, etc. Overloads in loose materials.

Narrow buckets available for trench and cramped excavating.

TYPE "K"
STANDARD BUCKETS

For rehandling bulk material. Light but strong. Can be equipped with counterweight jackets, also bottom teeth for certain kinds of digging.

Light and Extra Light Type "K"

Built lighter for greater capacity in materials which do not require the weights of the Standard Type "K" for penetration.

TYPE "S" BUCKETS

Wider and heavier than corresponding sizes of "K" Buckets. For unloading barges, flat cars, stock pile work, etc. Good for "clean up".

Light Type "S" Rehandling Buckets

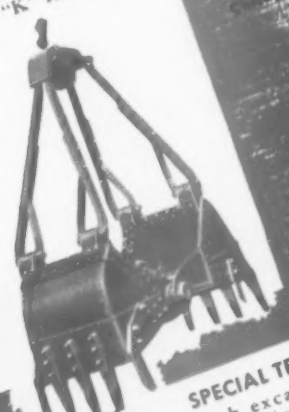
Lighter than Standard "S" Buckets but designed to have equal strength and durability.

GRAPPLES

of various designs are available for handling stone, scrap iron and pulpwood.

ROUND NOSE CONSTRUCTION

is available on "M", "D" and "DX". Heavy curved lip gives a surface that penetrates more readily and withstands shocks and strains that would bend the lip of a conventional bucket. Strains and impacts are distributed over the entire heavy and continuous lip.

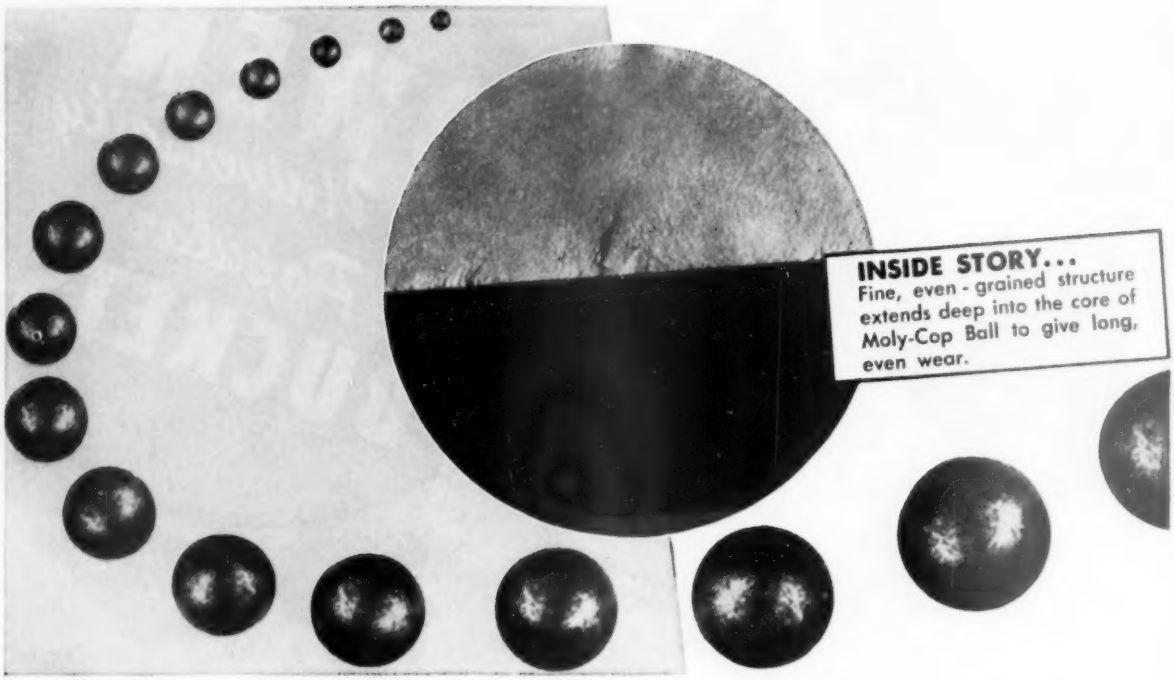


SPECIAL TEETH

for trench excavation and straight down digging with vertical and parallel walls are available for "M" and "D" Buckets

THE OWEN BUCKET COMPANY
1000 BREAKWATER AVE
CLEVELAND 2, OHIO

BRANCHES:
New York, Philadelphia,
Chicago, Berkeley, Calif.



If you want a finer grind . . . use a finer ball!

SHEFFIELD MOLY-COP

TRADEMARK REG.

COPPER-MOLYBDENUM-ALLOY

Grinding Balls

For fine grinding you want a ball that will give you the highest possible production rate with the lowest cost per ton of material ground . . . fewer chargings, less "down time."

Sheffield Moly-Cop Balls meet that requirement — because Sheffield's exclusive alloy and automatically controlled manufacturing methods produce a ball of finer, denser, more uniform structure. You get toughness and greatest resistance to abrasion. Moly-Cop Balls wear evenly, retain their spherical shape longer.

Tests have proved that Moly-Cop Balls wear up to 35% longer than alloy cast steel balls; up to 50% longer than best quality unalloyed carbon forged steel; and up to 120% longer than cast white iron balls. Considering initial costs and length of service, the net savings that result from the use of Moly-Cop Balls are substantial.

Used and proved around the world—*Sheffield engineers* are ready to prove the money-saving advantages of Moly-Cop Grinding Balls in your operation. Get in touch with us now.

Export Representatives: ARMCO INTERNATIONAL CORPORATION, MIDDLETOWN, OHIO

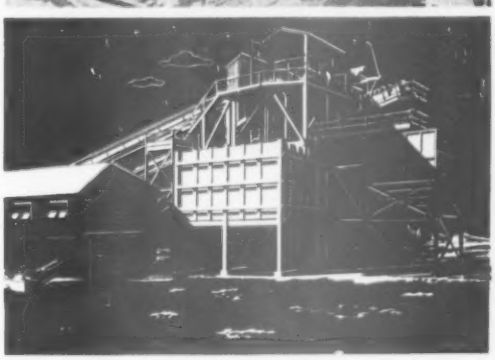
SHEFFIELD
STEEL
CORPORATION
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

PROFITABLE PLANTS DON'T JUST HAPPEN!

THEY'RE DESIGNED THAT WAY . . . BY WKE

Better specification sand and gravel at lower cost . . . that's what you get with a WKE designed aggregate plant. And it's not just a matter of luck. For WKE plants are the result of long experience and integrated planning of the job from start to finish. Aggregate analysis, plant design, procurement and installation of equipment and initial plant operation — for any or all of these functions you can rely on Western Knapp Engineering Company, a division of Western Machinery Company.

Coupled with WKE's specialized knowledge in plant design, you gain the advantages offered by the extensive purchasing and manufacturing facilities of Western Machinery Company. In addition to being a leading supplier of crushing, washing, screening and material handling plants, Wemco also manufactures a line of aggregate processing equipment including Sand Preparation Machines, Attrition Machines, Sand Pumps, Hydroseparators and Thickeners. This close coordination between plant design and equipment procurement and manufacturing assures profitable sand and gravel operations with facilities that are custom-built according to your exact requirements.



If you're planning new plant construction or the expansion of present facilities, why take a chance. Put the WKE/WEMCO team to work on your problem and get the job done right! *Write today for additional information.*

WKE

WEMCO

760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

PRINCIPAL OFFICES

San Francisco · Sacramento · Salt Lake City · Spokane
Denver · Pocatello, Idaho · Phoenix · Chicago · Hibbing, Minnesota · New York · Jeffersonville, Indiana
Toronto, Canada

ALONG THE MOHAWK TRAIL

This model plant at Jamesville, N. Y. is attaining records in low cost production for small capacity plants at 2200 barrels per day and is a tribute to the Alpha organization. Modern design includes detailed attention to safety, cleanliness and pride in appearance. We are pleased to have been chosen to do the detail engineering design of this plant and to have charge of its erection.

For design and construction of your new plant or extensions, contact us at any of our offices

MACDONALD ENGINEERING CO.

Construction Engineers

C. P. R. Building
Toronto, Canada

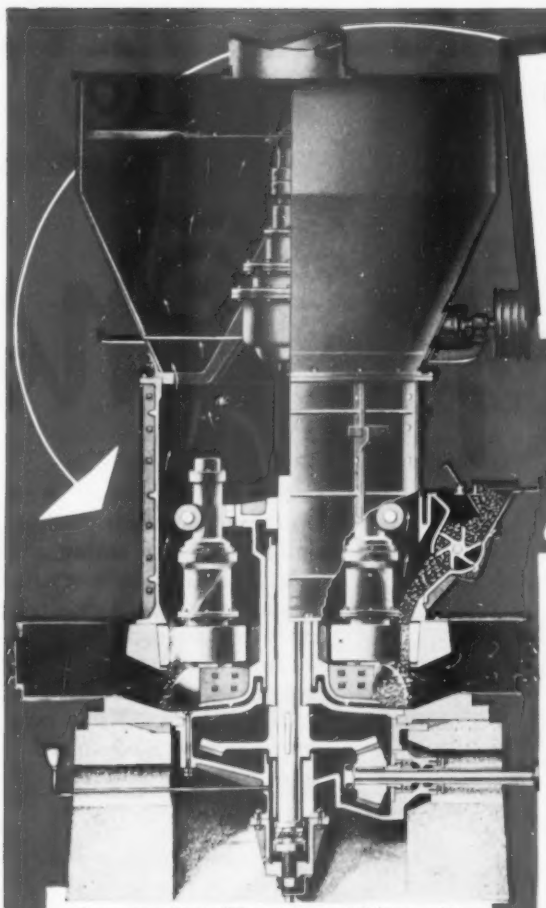
188 West Randolph Street
Chicago

885 Bryant Street
San Francisco, Cal.

Increase Your Output Of FINE GRINDING

...with greater uniformity
...at lower cost

WILLIAMS Roller Mills



Cross section of Roller Mill showing how material is ground by rolls rotating against bull ring, then air swept to separator which extracts fines and returns coarse material to mill for regrinding.

Limestone, burned and hydrated lime, clays, kaolin, talc, gypsum — whatever the material, if it has to be finely ground, there's a Williams Roller Mill to do it — faster, for stepped up production — more accurately and uniformly —and at far less cost!

Automatic and continuous in operation, the Williams also dries and grinds simultaneously. Instantly adjustable for finenesses of 20 to 400 mesh, even down to micron sizes. No built-up cushions of "fines" can impair grinding efficiency because the constant upward air current carries ground materials to the air separator which discharges *all* finished materials and returns *only* the oversize product to the mill for further grinding.

Feeding rate is automatic and self-adjusting, positive and simple in action—Anti-friction roller and ball bearings reduce down-time for lubrication, save oil and put more power into grinding—Take-up for wear is continuous and automatic—Rugged forgings, electric steel and alloy castings guard against wear and breakdowns—These and many other outstanding features have made Williams Roller Mills the standard for fine-grinding operations.

OTHER WILLIAMS EQUIPMENT

HAMMER MILLS

"Super-Slugger" models, with capacities up to 550 tons per hour, that reduce power shovel loaded rock to 1½", ¾" or agstone in one operation.

"Slugger" models, with capacities up to 100 tons per hour, that reduce "one-man" size stone to 1¼", ¾" or agricultural limestone in one operation.

Other models, with capacities from 5 to 200 tons per hour, for reducing 4" to 6" stone to ¾", ½" or agricultural limestone in one operation.

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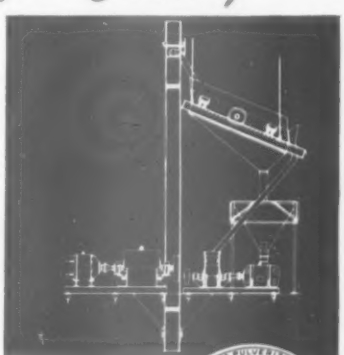
Backed by years of know-how and experience, Williams can build any type of ready-to-install plant to handle crushing, grinding, air separation, sifting, conveying and magnetic separation including storage bins and electrical equipment.



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CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

HOW ALLIS-CHALMERS HELPS

Rotary Kilns

IF YOU'RE THINKING in terms of profits, it will pay you to consider the cost-cutting advantages of Allis-Chalmers rotary kilns and auxiliaries shown here. Improvements such as these will pay for themselves several times over in lower maintenance and production costs. Kilns now in service can be modernized with these profitable features.

A-4090

CEMENT PLANTS MODERNIZE

AIR-COOLED KILN END

. . . Will pay for itself in 2 to 3 years, in refractory savings alone! You avoid loss of valuable production time because fewer shutdowns are necessary to replace end brick. This results, too, in savings on brick and labor. And — an air-cooled kiln end makes possible a positive air seal between the firing hood and the kiln, resulting in fuel savings. The temperature of the air inside the kiln is not decreased by infiltering cold air.

MOVABLE FIRING HOOD

. . . Can be easily adjusted to compensate for expansion and contraction of kiln. Maintains a good air seal with kiln, keeping cool air out and reducing hot air loss at kiln end. Allis-Chalmers firing hoods are designed to use standard refractory brick lining and have access and inspection openings. They're built heavily, to stay round and rigid, even after years of service.

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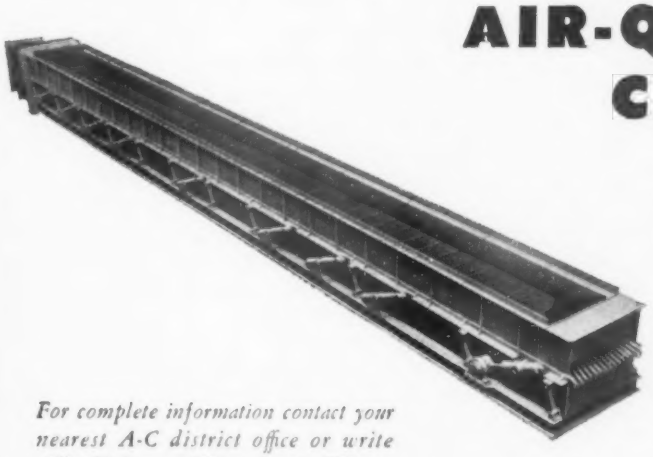

. . . Results in maximum rotary kiln economy and fuel utilization. The air-quenching cooler is designed to isolate and capture the hottest secondary air above the cooling clinker and return it to the kiln. True air-quenching of clinker results in reduced grinding costs because clinker is cooled rapidly (by an upblast of cooling air) not gradually. Installation, power and maintenance costs are less than with any comparable cooler.

For complete information contact your nearest A-C district office or write Allis-Chalmers, Milwaukee 1, Wis.

ALLIS-CHALMERS

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that saves money for cement makers*

Most cement is made by a process of "put 'n take." *Put* in lots of water to make the raw materials pumpable. Then, *take* all the water out to produce the dry, finished cement. The problem is to use as little water as possible and yet keep the mixture fluid. Victor Sodium Tripolyphosphate does the trick. Less than 1% of Victor "tri-poly" helps water carry far more raw cement particles. This enables cement makers actually to increase production around 10%, without adding new equipment . . . all this from the use of this versatile Victor chemical.

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Finding faster, lower cost, or better methods of producing better goods has been our objective for 55 years. The helping hand of Victor's research department and the excellence of Victor chemicals are well known to all industry, from agriculture to atomic energy . . . from food to pharmaceuticals. If you have a process or product problem that chemistry might solve, we suggest that your men get together with ours. Victor Chemical Works, 141 W. Jackson Blvd., Chicago 4, Ill. In the West: A. R. Maas Division, 4570 Ardine St., South Gate, Calif.

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Dependable Name in *Chemicals* for 55 Years

*Note to Cement Makers: For details, write for technical bulletin VJ-53.

Editor's page

Cement Industry Emphasizes Good Working Conditions

ARTICLES in this issue of ROCK PRODUCTS discussing new and rehabilitated portland cement plants bring out the geat technological progress being made by the industry. These mills and others which have been described over the past several years are much more efficient in every respect than older plants. They are designed to reduce operating costs and all of them emphasize controls to improve the quality of portland cement.

Aside from considerations of economy and quality control there are other developments noted throughout most newer installations which, while not representative of technological progress, will prove to be extremely important to continued successful plant operations. We have reference to features of plant design and special provisions which contribute to more effective utilization of labor and to its welfare.

In recent years the investment in plant per employe has multiplied several times over not only due to the depreciation of the dollar but because of the greater costs of more modern, higher capacity equipment and because of design features and extra installations to make working conditions safer and more attractive.

Mechanization

Many of the arduous tasks and back-breaking jobs around the mill have been eliminated. Powered equipment, including scoop loaders, lift trucks, chain hoists, tractors, bulldozers and car-spotters, are now doing much of the heavier work. Dust collectors are being installed not just to forestall possible complaints from neighbors or to recover dust for its values, but in the interests of good housekeeping and pleasant working conditions.

Newer installations are almost fool-proof in their protective devices to prevent accidents and the mills have spaciousness throughout, which contributes to safety and improved performance of workers engaged in maintenance and repair. They have adequate ventilation in hot areas, elevators to high places which eliminate tiring stair-climbing, water coolers in convenient locations, modern washrooms, changehouses and other personal conveniences.

These features of design and the special provisions for the protection and the well-being of the worker add substantially to plant building costs that are far out of line anyhow, even without extras, but they are a sound investment from any point of view.

New and improved equipment and the way machinery is being installed and protected would seem to make it inevitable that the industry's already fine record in accident prevention will be surpassed. One reason is that the modern cement mill with all its safeguards and excellent working facilities for employes will have at least an equal chance with local industries in competition for good responsible workers.

Eye Appeal

Not only are the newer cement mill installations equipped for cleaner, safer and more attractive working conditions within, but substantial investment is being made to improve outward appearance. All of the plants discussed in this issue have gone in for landscaping with the result that they convey the impression that they must make a good product.

This emphasis on attractive appearance is well illustrated by the front cover of this issue which shows the Jamesville, N.Y., plant of Alpha Portland Cement Co. This plant is in process of extensive landscaping. The surrounding soil was unproductive and it required that ten thousand cubic yards of topsoil be placed to support plant growth.

A professional landscape firm was engaged and well over a thousand specimens of many varieties of evergreen and deciduous trees and shrubs, and flower beds have been planted for year-around color.

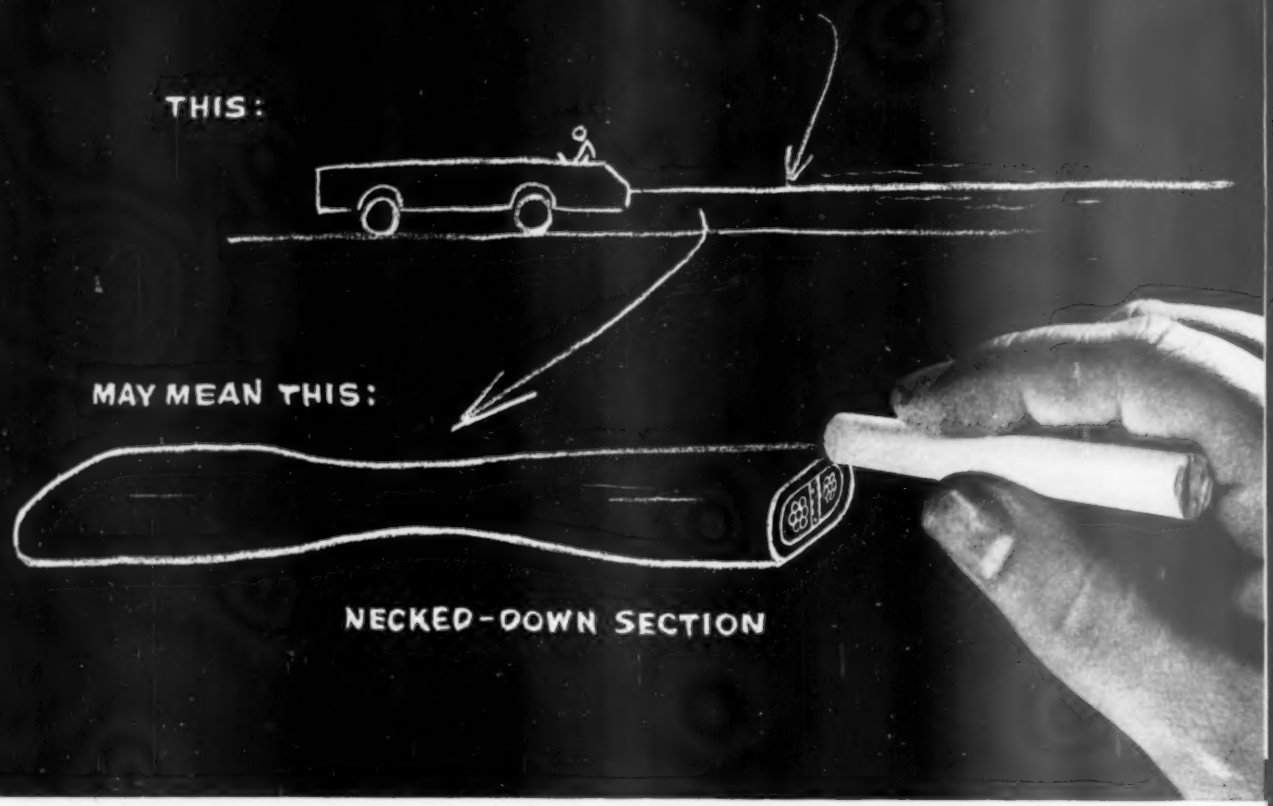
The attractive surroundings have made an impression on the traveling public and on residents throughout the area, which is a forward step in public relations. What seems even more important to us is, the effect that the landscaping and the working conditions have had on the worker.

When mill workers make inquiry as to the types of plantings and their availability for their own homes, and when they bring their families out to the mill in the evenings to show off the landscaping and appearance of the plant, as they are doing at Jamesville, it would seem that those workers have an attitude that will permeate their communities.

What better approach can there be to building good public relations, than by first establishing sound employe relations through providing good working conditions in attractive surroundings? It is things like these that will attract good workers, influence the attitudes of employes in the right direction and help make them happy in their jobs. It follows then that the good will of local communities can be gained because it is earned.

Bror Nordberg

HOW TO SPOT DAMAGE FROM TOO MUCH TENSION



. . . AND WHY ANACONDA'S NEW BALANCED DESIGN ADDS SAFETY, LONGER LIFE TO CABLE

Necked-down cable shows overstretching. Jacket and insulation become thin, easily punctured. Moisture penetration or a broken ground conductor may make the cable hazardous.

ANACONDA'S ANSWER: BALANCED DESIGN

Tension devices help; but aren't cure-alls. An added safeguard lies in the balanced design of Anaconda's new mining-machine cable. Stretchability of the ground has been increased. It will not break before the power conductors. A new neoprene jacket has higher compression-cutting resistance and tensile strength. In the insulation more strength and moisture resistance are obtained from a cold-rubber base . . . similar to that used by tire makers to mold a tougher tire. Stranding, too, has been redesigned to make the whole cable more flexible . . . at no greater cost. You get less trouble from tearing, cutting, gouging and abrasion caused by rib-pinching, runovers and dragging.

MUCH LONGER AVERAGE LIFE

In shuttle cars recently surveyed in 15 mines, ANACONDA Cables last 3 times as long as cables made only a few years ago. To learn why this is so, ask your nearest Anaconda Sales Office or Distributor for a sample section of this new cable. Examine it . . . take it apart. And remember that no ANACONDA Mine Cable has ever failed a U. S. Bureau of Mines flame test. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

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TYPE SO FOR:
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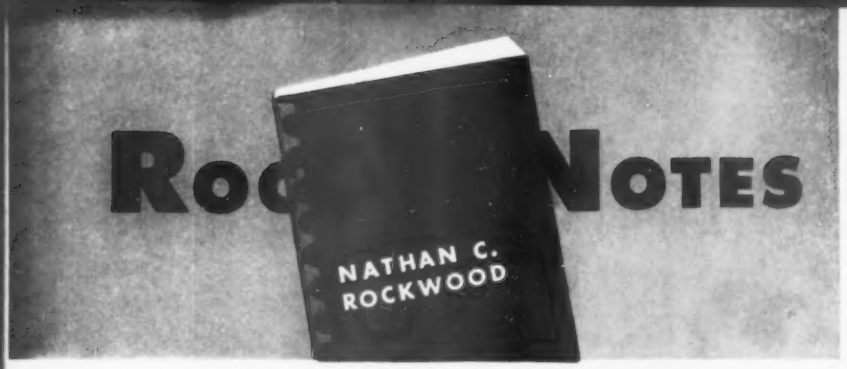
WELDING CABLES



Keys to Concrete Research

WE SUSPECT that there are numerous others, like ourselves, strivfor some understanding of the practical significance of some of the latest developments in cement and concrete research, who need a refresher course in physical chemistry. For when an earlier generation than the present studied inorganic chemistry as part of an engineering course, physical and other kinds of chemistry were lumped together without distinction. Since then physical chemistry has been developed into a specialized science. Progress hasn't all been in the direction of a clearer understanding of some of the phenomena treated, for new knowledge has in a few instances tended to disprove some of the "laws" of the earlier texts, or at least to show that they have limitations, not then taken into account.

For those who have hopes of keeping abreast of these developments in physical chemistry, we have before us the seventh edition of a long standard college text-book, "Physical Chemistry for Colleges," by E. B. Millard, professor of physical chemistry, Massachusetts Institute of Technology.* Maybe the author or the publisher having seen some of our articles on "Prospective Chemistry of Cement and Concrete," thought we could use a review copy to advantage! We can, and we believe many of our readers could, too. It is not to be expected that researchers in these fields can take time and space to explain the fundamentals of the sciences, upon which their particular themes are based, yet their highly technical texts can hardly be read intelligently without some understanding of at least a few of these fundamentals. We refer, of course, to readers, not laboratory technicians with experience in these fields, but to the ordinary reader who is trying to apply new knowledge to practice.

Not Yet an Exact Science

An examination of this text-book gives us a better appreciation of the hesitation experts exhibit in propounding new theories, which as yet they know can not be proved. For example, in some of our own discussions we have used the term "laws of nature" with probably too much confidence. According to this author: "Some of the general laws of chemistry appear to be absolutely exact; they describe faithfully the results of most carefully conducted experiments, and the apparent deviations of these laws become less and less as the manipulative skill employed in testing them increases. . . . Other 'laws' do not accurately describe the results of measurements, and their deviations do not show errors in the experiments. Such laws are useful approximations that show the properties of chemical systems with reasonable accuracy under certain conditions, and with larger deviations under other conditions."

With this understanding, we shall try to be less critical of the progress made in cement and concrete research. However, it will not deter us from "sticking our neck out," on occasions where some "natural law" or experimental observation seems to have been overlooked or to be relevant to our discussion, but we will do it with more comprehension of why specialists in the science hesitate to affirm or deny and are often skeptical. After all, as most of our readers appear to see, we are merely attempting to suggest and stimulate activity in new or different avenues of approach to engineering researchers, in the hope that they will better understand and appreciate what the specialists are doing. Much progress has been made in many sciences by people, who are not experts or specialists, for the simple reason that their ideas are not withheld because of that fear of exposing ignorance of experiments or "laws" which deters the experts from the same kind of speculation.

Subjects Covered

Just to refresh the memories of those whose acquaintance with physical chemistry may have become a bit rusty, we list the 19 chapter heads as follows: (1) Determination of Atomic Weights; (2) Elementary Thermodynamics; (3) Thermochemistry; (4) Properties of Substances in the Liquid State; (6) Crystalline Solids; (7) Solutions; (8) Solutions of Ionized Solutes; (9) Equilibrium in Homogenious Systems; (10) Heterogeneous Equilibrium; (11) Equilibrium Phase Diagrams; (12) Kinetics of Homogeneous Reactions; (14) Periodic Law of the Elements; (15) Radioactive Changes; (16) Atomic Structure; (17) Colloids; Surface Chemistry; (18) Free Energy of Chemical Changes; (19) Potentials of Electrolytic Cells.

The text necessarily deals primarily with the methods employed in conducting different laboratory tests and experiments, and hence is not generally interesting reading for the layman, yet the discussion of the results and the theories involved is interesting, and in fact necessary reading, to anyone who cares to take the trouble of understanding much of the literature which eminates from the research laboratories of the Portland Cement Association, and from similar institutions abroad. Of course, no one of ordinary intellectual capacity can sit down and absorb very much of these subjects at one sitting or many, but it will be found an excellent reference book when in studying some of these cement and concrete research reports, the interested reader comes upon a subject involving physical chemistry that he does not fully grasp. We expect Dr. Millard's book will be very helpful to us in this respect at least, and there must be many others in the same boat.

Future Possibilities

We have heard of experiments with radio-active elements to be made, or possibly now in progress, in which attempt will be made to trace and determine the reactions taking place in hardened concrete or cement. So far as we know, nothing has yet been published. Obviously, under our present theories of reactions in the solid state, and through the medium of solutions, there must be a movement or migration of the ions of one or more of the elements involved from one association, or "system," to another. That obviously takes place in the reaction between the alkali in portland cement and certain kinds of silica or silicious aggregate. The movement of the sodium for considerable distances through the mass has apparently been proved, for there is seldom enough sodium in direct contact with a piece of aggregate to account for the amount of new silicate substance formed. The proposal has been made to trace such ionic movements, or concentrations, by use of radio-active sodium.

Hence, we were particularly interested in the following two paragraphs from Dr. Millard's book, where he is discussing "atomic structure": "The possibility of a nuclear reaction arises whenever protons, electrons, neutrons or alpha particles strike a nucleus (of an element) with sufficient velocity. Disintegration or synthesis may result, and some of the nuclei thus produced are identical with the natural nuclei. For illustration, polonium has been synthesized from bismuth (element No. 83) and neutrons; and of course it decomposes radioactively with the emission of alpha particles, as does natural polonium (element No. 84).

(Continued on page 194)

*International Chemical Series—Physical Chemisty for Colleges. E. B. Millard, McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y., 1953; price $6.00.

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LABOR RELATIONS TRENDS

The Seventh-Day, Premium Pay Problem

By NATHAN C. ROCKWOOD

EVER SINCE the 40-hour week became the legal standard, employers in operations which require work of some nature on the sixth and seventh days have been bothered by union labor contracts on how to define the amount of the premium pay for work on the sixth and seventh days, or on Saturdays, Sundays and holidays as the case may be. A good example in our own industries is a dispute over the interpretation of certain contract clauses which was decided April 13, 1953, by an arbitrator appointed by the Federal Mediation and Conciliation Service—Walter E. Boles, Jr.

The Rotan, Texas, plant of the National Gypsum Co. had a contract with Local 74 of the United Cement, Lime and Gypsum Workers International Union (A.F. of L.) in which the following clauses appear:

"Article 6. (Hours and Labor).

"(A) Forty hours shall constitute a work week. In the event of a change in the Wage & Hour Law, the Company and the Union will abide by same. Eight (8) consecutive hours exclusive of lunch period (not less than 30 minutes or more than one hour) shall constitute a day's work. All time in excess of eight (8) hours per day, forty (40) hours per week shall be classed as overtime and paid for at the rate of time and one-half. Any work performed on the seventh consecutive day worked during the regularly scheduled work week shall be paid for at the rate of two (2) times the employe's regular rate of pay. Should an employe lose time through no fault of his own during a scheduled work week, he will not be penalized when computing overtime for the seventh day.

"(B) For the purpose of establishing and determining the work day and work week, it is agreed that the work day shall begin at 8:00 A.M. and cover 24 consecutive hours to 8:00 A.M. of the following day. However, for the purpose of computing the 6th and 7th consecutive days worked in any work week, a day worked shall consist of eight (8) consecutive hours. The work week shall begin at 8:00 A.M. Monday morning and consist of seven consecutive 24-hour work days to the following Monday morning at 8:00 A.M.

"(C) The Company reserves the right to arrange the working hours of it's employes to suit conditions, agreeing to comply with the regulation calling for overtime for work in excess of eight (8) hours in any one day and overtime for work in excess of forty (40) hours in one week as set up by the National Wage & Hour Law. Any overtime paid on the daily basis shall not be duplicated on a weekly basis.

"(G) All work performed on Sunday shall be paid for at one and one-half times the normal wage rate.

"(H) . . . A holiday occurring during the first five days of the work week, whether worked or not, shall count as a day worked in computing overtime pay in accordance with this Article.

"Article 10. (Handling of Complaints).

"Article 11. (Terms of Agreement).

". . . This agreement becomes effective July 1, 1952, and shall continue in effect each year thereafter unless sixty (60) days notice is given in writing by either party prior to any expiration date; such written notice shall contain any changes or amendments desired and only such changes or amendments contained in such notice will be discussed by the conferees."

Union's Arguments

The arbitrator's report states: "(1) The union contends mainly that the contract is clear and unambiguous in providing a single work week for *all* members of the bargaining unit beginning 'at 8:00 A.M. Monday morning . . . ;' it follows, therefore, the union asserts, (a) that the company has no contractual right to establish a work week for maintenance employes different from that for production workers, and (b) that the 'seventh consecutive day worked during the regularly scheduled work week' must, under the contracts, be Sunday—Sunday for *all* members of the bargaining unit—with pay at double the regular rate.

"(2) The union asserts further (a) that it has long been the company's practice to start the production employes' work on Monday; (b) that the gypsum industry is not a 'continuous operation' industry; and (c) that the 'custom' of the industry is to begin the work week on Monday.

"(3) The union takes the position that the 'side agreement' between the company and members of Local No. 74, dated November 21, 1951, (a) expired by express terminology on June 30, 1952, and (b) does not change the meaning and application of the current collective bargaining agreement as signed on January 5, 1953.

Company's Arguments

"The company contends mainly (1) that the following language of Article 6 (B) in the contract ('The work week shall begin at 8:00 A.M. Monday morning and consist of seven consecutive 24-hour work days to the following Monday at 8:00 A.M.') constitutes only an 'example' or illustration of a 'work week' and was not intended to spell out a work week beginning on Monday:

"(2) that the company reserved the right to determine the work week in Article 6, Sec. (C) of the contract, as follows: 'The company reserves the right to arrange the working hours . . . etc.;' that 'hours' as used here includes 'days' and 'weeks;'

"(3) that the 'side agreements' of September 23, 1949, July 1, 1950, and November 21, 1951, with reference to Sunday pay for maintenance employes, became, in effect, part of the regular agreement; that, since the union requested no negotiations concerning the 'side agreement' when the regular agreement expired on June 30, 1952, the company assumed that the 'side agreement' continued in force, and would continue in force, until 'reopened for negotiation'—that it is the custom of the parties to continue under the old agreement until a new one is signed; that, in short, the parties should be negotiating about this matter 'as a form of wage reopener' instead of arbitrating the issue;

"(4) that the time to do certain maintenance work is on Sunday, when the plant is not in operation, and that the company had no intention of contracting to 'tie its hands' so that it could not schedule 'regular' maintenance work on that day (subject only to the time-and-one-half Sunday *as such* provision of the contract);

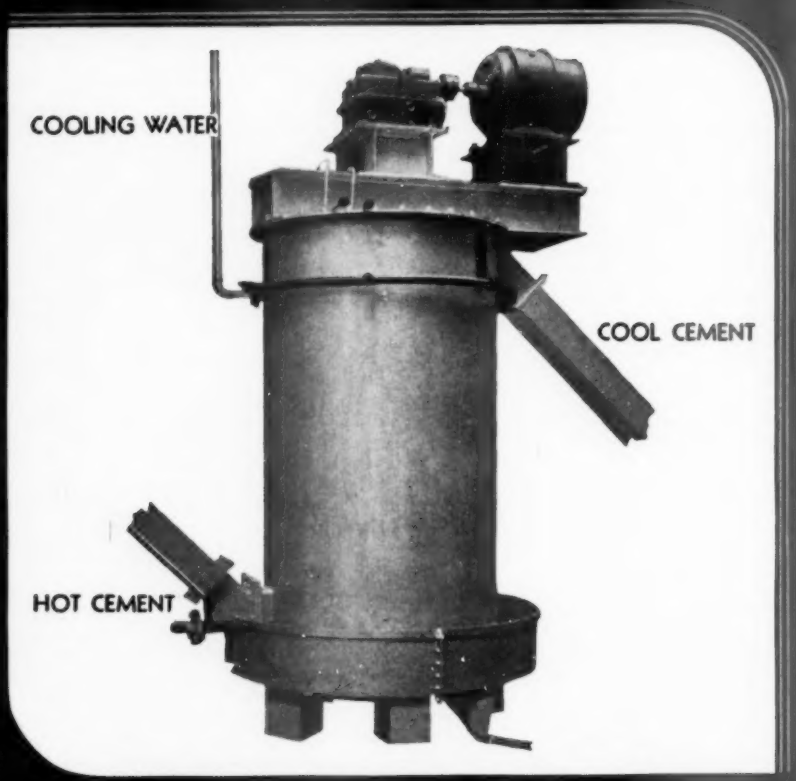
"(5) that gypsum 'industry practice' with reference to the beginning and ending of the work week should not be considered in the arbitration because it did not enter into the negotiations which resulted in the contract."

Arbitrator's Interpretation

The arbitrator held that he must find the meaning of the exact wording, that he had no authority to look beyond "the four corners of the agreement." He said he must also consider the nature and significance of the "side agreements," which had permitted the maintenance crew to work Sundays at time-and-a-half instead of double time—that is, whether the contract called for double time Sunday because it was the seventh day or because it was Sunday. The arbitrator first decided that the company's contention that the wording

(Continued on page 196)

FOR COOLING HOT CEMENT



Cement manufacturers are frequently confronted with the problem of cooling hot cement to temperatures acceptable when making bulk shipments or for immediate packing in paper bags. The FLS Cement Cooler was especially developed for cooling hot cement. • The FLS Cooler consists of a tank, water-cooled externally, the cement being introduced into the bottom and conveyed in a thin layer along the inside of the water-cooled wall to the top, where it is discharged. Thus an intimate contact is established between the cement and the water-cooled surface, assuring high-cooling efficiency. • In addition to cement, the Cooler is applicable to many other similar *dry* pulverized materials.

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PEOPLE in the news

Committee Chairman

CARL F. CLAUSEN, manager of the manufacturing process section of the Portland Cement Association, Chicago, Ill., has been appointed chairman of the A.I.M.E. committee on

Carl F. Clausen

cement, lime and gypsum. Robert A. Kinzie, Jr., superintendent of the Davenport, Calif., plant of the Santa Cruz Portland Cement Co., San Francisco, is vice-chairman. Other members of the committee include D. E. Eilertsen, production mining engineer, National Gypsum Co., Buffalo, N.Y.; J. T. Ellerbeck, general superintendent, Utah Lime and Stone Co., Grantsville, Utah; B. H. Puerner, assistant manager, processing machinery department, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; C. D. Rugen, project engineer, Universal Atlas Cement Co., New York, N.Y.; W. E. Trauffer, editor, *Pit and Quarry*, Chicago, Ill.; H. L. Waldthausen, Jr., works manager, Blue Diamond Corp., Blue Diamond, Nev.; and E. I. Williams, president, Riverton Lime and Stone Co., Riverton, Va.

Sales Managers

RUSSELL T. DRENNAN has been appointed eastern sales manager and Joseph A. Voss, Jr., has been named assistant eastern sales manager of the chemical division of Kaiser Aluminum and Chemical Sales, Inc., Oakland, Calif. Mr. Drennan was formerly district sales manager for basic refractory brick, mixes and mortars along the Atlantic seaboard. Prior to that he was with the Baton Rouge, La., plant. He is a graduate of McKendree College, Lebanon, Ill. Mr. Voss, a graduate of Case Institute of Technology, Cleveland, Ohio, was formerly district sales manager for the Pittsburgh, Cleveland, Detroit and Chicago areas. Both will continue to maintain headquarters at the eastern general sales offices, Akron, Ohio.

Executive Vice-President

CHARLES B. BAKER has been elected executive vice-president of the Universal Atlas Cement Co., New York, N.Y., to succeed George H. Reiter,

Charles B. Baker

who has retired. Donald C. Leo, secretary, has been appointed general attorney.

Mr. Baker joined the company in 1942 and one year later became secretary and general attorney. He was elected a director in 1944 and in 1949 was appointed assistant to the president. Mr. Baker has served as vice-president and general attorney since 1951. He was graduated from Phillips Exeter Academy in 1931, attended Dartmouth College, and was graduated from the University of Chicago in 1938.

Mr. Leo became associated with the company as an attorney in 1943. He was appointed assistant secretary in 1947 and in 1951 was elected secretary. A native of New York, N.Y., he graduated from Fordham Law School in 1926.

Mr. Reiter has served as executive vice-president since 1951. Previously he had been vice-president in charge of sales and commercial activities and had been a director of the company since 1941. He has been associated with the portland cement industry for 27 years and has long been one of its outstanding leaders. Mr. Reiter was manager of The Cement Institute from 1933 to 1937, and also served

Donald C. Leo

in Chicago as secretary and later as chairman of the NRA-National Code Authority for the portland cement industry from 1933 to 1935. Mr. Reiter is now residing with his wife in Clearwater, Fla.

Permanente Directors

HENRY J. KAISER, president of Permanente Cement Co., Oakland, Calif., E. E. Trefethen, Jr., executive vice-president and treasurer; Edward H. Heller, vice-president; L. S. Corey, H. W. Morrison, Gilbert J. Shea, and D. V. McEachern were elected directors for the coming year at the recent meeting of the board of directors. Other officers elected are Carl R. Olson, vice-president; Wallace A. Marsh, vice-president and general manager; William Marks, secretary, and Paul E. Rogers, comptroller.

Named Vice-President

HAROLD H. SHORT has been appointed vice-president and general manager of the Milne Ready-Mix Concrete Co., Boulder, Colo. He was formerly superintendent of construction of the Willow Creek Dam for Peter Kiewit Son's Co. Prior to that he was with J. T. McDowell & Sons. Mr. Short is an engineering graduate of Colorado A. & M. College, Fort Collins, Colo. During World War II he served with the Sixth Infantry division in the Pacific theater and was discharged as lieutenant colonel.

Plant Manager

PAUL J. DUMAS has been appointed plant manager of the New Orleans, La., plant of National Gypsum Co.,

Paul J. Dumas

Buffalo, N.Y. This plant is part of the Asbestone Corp. recently purchased by the company. Mr. Dumas was formerly plant manager of the paper mill at Pryor, Okla. He is a graduate of Washington and Lee University, Lexington, Va., and also attended New York University, New York, N.Y.

District Manager

OCTAVE AMMON has been appointed district manager for the Syracuse, Binghamton and Rochester, N.Y., plants of Universal Concrete Pipe Co., Columbus, Ohio, with headquarters at Syracuse. Melvin Sanford has been made superintendent of the Binghamton plant to succeed the late Everett C. Winters. William Halen has joined the company as sales engineer at Rochester, N.Y.

Becomes Vice-President

LOUIS W. ROGERS has been elected a vice-president of the Consolidated Cement Corp., Chicago, Ill. He has been sales director of the Fredonia, Kan., division since 1928. Mr. Rogers started his career in the cement industry in 1919 with the Great Western Portland Cement Co.

Technical Director

JOSEPH A. KAUER has been appointed technical service director of the Huron Portland Cement Co., Detroit, Mich. He was formerly technical service representative.

On Board of Directors

HARLEY C. LEE, vice-president, has been elected a director of Basic Refractories, Inc., Cleveland, Ohio. Mr. Lee joined the company in 1926 and has been a vice-president since 1945. During World War II, he was in charge of the technical department of Basic Magnesium, Inc., a subsidiary, at Henderson, Nev. For ten years prior to that he was director of research for Basic Refractories.

Named Vice-President

JOHN V. ANDREWS has been named vice-president of The Kelley Island Lime and Transport Co., Cleveland,

John V. Andrews

Ohio. Mr. Andrews joined the company in 1937 and has been manager of operations for the past several years. He is a graduate of Case Institute of Technology, Cleveland, Ohio.

On Board of Directors

M. MOSS ALEXANDER was re-elected president of the Missouri Portland Cement Co., St. Louis, Mo., at the recent board of directors meeting. Other officers are: E. W. Henne, executive vice-president and treasurer, and John H. McNatt, vice-president and secretary. Fielding Childress, A. P. Greensfelder, Lon W. Harlow and E. W. Henne were elected to the board of directors.

Secretary Retires

J. J. MATTHES has retired as secretary-treasurer of The Alpha Portland Cement Co., Easton, Penn., after 50 years of service. He will be succeeded by K. T. Wright as secretary and treasurer. I. J. Rinker has been appointed assistant secretary and assistant treasurer. Mr. Matthes will continue to serve as a director of the company.

Vice-President of Sales

FRANK J. CAIN, JR., has been elected vice-president in charge of sales for Giant Portland Cement Co., Philadelphia, Penn., and its subsidiary, Carolina Giant Cement Co.

Sales Manager

HENRY J. AUER has been promoted from salesman to sales manager for the metropolitan Chicago area of Mar-

Henry J. Auer

quette Cement Manufacturing Co., Chicago, Ill. He succeeds the late William H. Hurley, who died on June 7. Mr. Auer has been a member of the Chicago sales staff since 1944.

Joins Concrete Firm

FRED SCHREIBER, housing and products engineer for the Des Moines district office of the Portland Cement Association for the last 20 years, has become associated with the Des Moines Concrete Products Co., West Des Moines, Iowa. In his new capacity Mr. Schreiber will assist architects and building contractors on the design and construction of public and commercial buildings and residences using concrete masonry and precast concrete floor systems.

Executive Vice-President

BLAINE E. YUNDT has been promoted from secretary-treasurer to executive vice-president of the Fry Coal and Stone Co., Inc., Mercersburg, Penn. Miss Betty Shaffer has been appointed secretary; Edwin Baker, treasurer; Nevin Fleagle, plant superintendent at Cumberland, Md.; and John Heinbaugh, quarry superintendent at the Lake Lynn, Penn., plant (Vesco Corp.)

Vice-Presidents Retire

HARRY LEULIETTE and George Malfregeot, vice-presidents of the Universal Concrete Pipe Co., Columbus, Ohio, have retired after 32 years of service, but will continue to serve in advisory capacities. Mr. Leuliette was in charge of the eastern division and Mr. Malfregeot directed the upstate New York plants.

U.S. Roads Commissioner

FRANCIS V. DUPONT, former chairman of the Delaware State Highway Commission, has been appointed commissioner of public roads, U.S. Department of Commerce, Washington, D.C., to succeed Thomas H. MacDonald, who has retired. A graduate of Massachusetts Institute of Technology with a Bachelor's degree in mechanical engineering, Mr. duPont is recognized as one of the foremost administrators of public highways in America. He served as a member of the Delaware State Highway Department from 1922 to 1949 including 23 years as chairman. In 1948, he received a citation of distinction from the American Association of State Highway Officials.

Heads Concrete Firm

JOHN STRANDBERG, SR., Concrete Building Units Co., Kansas City, Mo., has purchased the interest in the company of his 25-year associate, C. Ernest Swanson, who is retiring from the business. Mr. Strandberg will be president and treasurer of the new incorporation and his son, John, Jr., will be vice-president and secretary.

Named Directors

GEORGE F. KARCH and A. Oakley Brooks have been elected directors of Medusa Portland Cement Co., Cleveland, Ohio. Mr. Karch is vice-president of the Cleveland Trust Co. and Mr. Brooks is a partner of Wood, Struthers & Co., New York, N.Y.

On N.A.M. Committee

MAX A. KOFFMAN, vice-president and treasurer of the Southwestern Portland Cement Co., Los Angeles, Calif., has been invited to serve on the National Association of Manufacturers' Committee on Industrial Relations.

Heads Research Laboratory

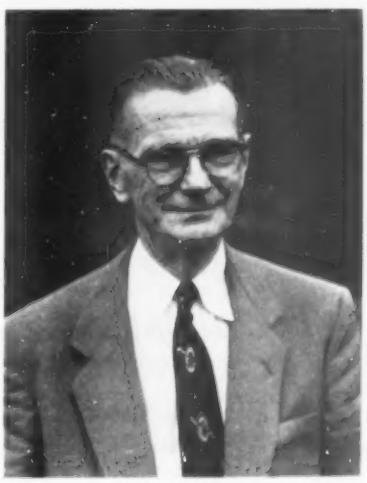
W. A. GALE, director of research, American Potash and Chemical Corp., Los Angeles, Calif., has been named to head the executive staff at the new research and development laboratory under construction at Whittier, Calif.

Prof. Voss Retires

PROF. WALTER C. VOSS, head of the department of building engineering and construction, Massachusetts Institute of Technology, Cambridge, Mass., retired July 1 after 25 years of service and will be succeeded by Prof. A. G. H. Dietz. Prof. Voss will continue his association with M.I.T. as professor emeritus and special lecturer, thus being able to contribute assistance to others in the department. He will also continue active in connection with the National Lime Association research program at M.I.T. and with association activities, having been engaged to write some articles on the subject of lime as used for construction.

Prof. Voss will serve as consultant to the Revere Brass and Copper Co., technical division, on the use of copper in building projects, which he has been doing for ten years. He will also do consulting work for the duPont engineering division, and has set himself up as a consultant on architectural construction and materials, with headquarters at 222 Memorial Drive, Cambridge 39, Mass. As a consultant, he will actively promote contacts with prominent architects and builders on buildings and other construction projects. He will also be available for lectures before groups of architects and builders.

At a party given by the alumni of the course in building engineering and construction, Prof. Voss was presented a plaque which expressed the appreciation of the alumni for the services of the late Prof. Ross F. Tucker and Prof. Voss, and announced the establishment of the Ross F. Tucker-Walter C. Voss Fund at M.I.T., the proceeds of which are to be used as a prize to an outstanding student during his senior year who has shown the greatest academic progress, the greatest tendency toward leadership, and having exemplary character.



Walter C. Voss.

OBITUARIES

ROBERT J. PAUSCH, secretary-treasurer of Marble Cliff Quarries Co., and Arrow Sand and Gravel Co., Columbus, Ohio, passed away June 18 after suffering a fractured hip in a fall at his home. He was 77 years old and had been associated with the two firms for more than 40 years.

ERNEST SPICKELMIER, nationally recognized authority in the building materials industry and president of Spickelmier Co., Per-Fit Products Co.,

Ernest Spickelmier

Spickelmier Products Co., Spickelmier Products of Louisville, Inc., and Water Repellents, Inc., died May 3 at his home in Indianapolis, Ind., after a short illness. He was 57 years old.

EDWIN P. MAY, president of the Union Sand and Gravel Co. and the Huntington Gravel and Supply Co., Huntington, W. Va., died July 11 at the age of 72. A native of Cannelton, Ind., Mr. May for many years was associated with his brother, the late Samuel May, in the contracting business. He was also head of the Union Concrete Pipe Co., Ceredo, W. Va., which he sold in 1947.

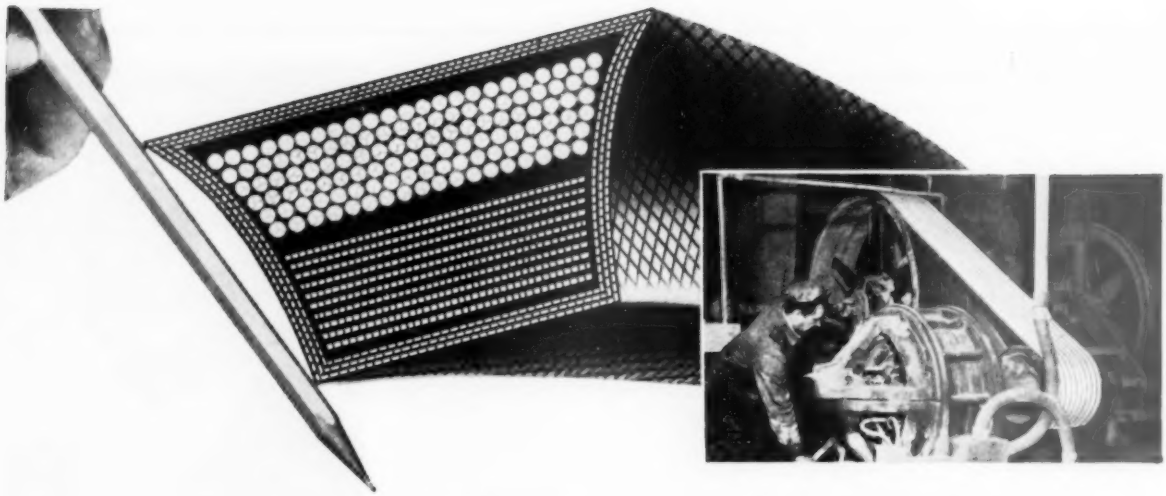
GEORGE W. RYAN, president of the Chazy Lime and Stone Co., Chazy, N.Y., passed away on June 25. Mr. Ryan was actively interested in affairs of the National Agricultural Limestone Institute, Washington, D.C., and attended the convention in Washington last January.

FRANK JULIUS JURSITS, retired assistant treasurer of the Kansas division of the Lone Star Cement Corp., New York, N.Y., died July 13 at the age of 70. Born in Budapest, Hungary, Mr. Jursits came to the United States in 1902 and had resided in Kansas City for 30 years.

GEORGE R. EMANUELSON, president of the Anderson Sand and Gravel Co., Inc., Rockford, Ill., died July 2 after a long illness. He was 68 years old and had been president of the company for 31 years.

LLOYD H. MERRILL, owner of the Bear River Sand and Gravel Co., Cedar Ridge, Calif., died suddenly on July 14. He was 45 years old and a native of Tropic, Utah.

ELMER L. WHITE, founder and president of the White Stone Co., Memphis, Tenn., died June 1 after an illness of several weeks. He was 74 years of age.

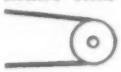


Gates V-Belts are built with CONCAVE SIDES

(U.S. PATENT NO. 1813698)

...that's why they last longer!

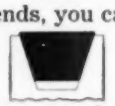
If you want lower V-Belt costs, just make this simple test...pick up *any* V-Belt and bend it as if it were going around a pulley.



As the belt bends, grip its sides between your fingers and thumb.

If the belt has *straight sides* you feel the sides bulge out. This forces the sides of the belt to press *unevenly* against the V-pulley . . . and you get concentrated wear at the points shown by the arrows.

Now, try this same test with the V-Belt that is built with CONCAVE SIDES **—the Gates Vulco Rope.**

As this belt bends, you can feel the CONCAVE SIDES *fill out* and become perfectly straight. 

These sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the full width of the Gates Vulco Rope and the CONCAVE SIDES therefore mean longer belt life and lower V-Belt costs for you.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-935

V-Belts — Hose
Molded Rubber Goods
for industry
World's Largest Maker of V-Belts

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THE GATES RUBBER COMPANY • DENVER, U.S.A.

industry news

Celebrates 50th Anniversary

NATIONAL LIME AND STONE CO., Findlay, Ohio, recently celebrated its 50th anniversary by holding an all-day outing and picnic for its employes and their families at Limestone Lake, a 40-acre area south of Findlay which was set up by the company several years ago for the exclusive use of its employes, and which offers swimming, fishing, boating and picnic facilities.

The National Lime and Stone Co. was organized in Carey, Ohio, on March 17, 1903, with its main offices established in Findlay in 1927. The Marion quarry was operated by National as the Ohio Blue Limestone Co. and became part of the parent organization in 1948. Other plants are operated at Buckland, Bucyrus, Carey, Delaware, East Liberty, Findlay, Lima and Rimer, all in northwestern Ohio.

Reopens Mineral Deposit

PHANTOM LODE MINING CO., Canon City, Colo., was recently organized for the purpose of opening deposits of mica, feldspar and silica in the Phantom Canon, Colo., district. The lode was worked more than 20 years ago, but had been abandoned since that time. The former workings are being developed together with new deposits. The feldspar will be shipped to the Consolidated Feldspar Co. plant in Denver, Colo., for processing, and the mica to an Arizona company. The silica will be sold locally. Officers of the new company are E. Leroy Knisley, president, and Ben Ringle, treasurer.

Safety Celebration

EMPLOYES of Marquette Cement Manufacturing Co.'s Des Moines, Iowa, plant were recently honored at a ceremony and dinner for their long-standing safety record. As of the last of June, plant personnel had accumulated 1979 consecutive, accident-free, working days. The safety record of the quarry personnel at that time was 595 accident-free days. The plant was reawarded the P.C.A. safety trophy previously won in 1943, 1949 and 1950, for its perfect record in 1952. Presentation of the trophy was made by H. F. Grayson, P.C.A. safety engineer, and accepted by Dave Fidler, plant machinist, in behalf of the employes. Other guests attending the safety celebration included Frank Moyle, Marquette vice-president; D. S. Colburn, director and executive vice-president of Marquette; J. C. Griffin, plant superintendent; G. F. Hetherington, president, and M. C. Miller, vice-president, Hawkeye-Marquette Cement Co.; Robert Hasset, manager, Des Moines Safety Council, who delivered the principal address; Judge Thomas J. Guthrie; and representatives of the United Cement, Lime & Gypsum Workers International Union.

Cover Picture

THIS MONTH'S COVER illustration shows the new wet process plant of Alpha Portland Cement Co. at Jamesville, N.Y. The plant, which was designed for a maximum production of 2200 bbl. daily, is exceeding this figure regularly. It is one of the most beautifully landscaped cement plants in the United States. The entire working area has been paved, and the principal roadways are of reinforced concrete construction. More than 1500 specimens of 30 varieties of evergreen and deciduous trees and shrubs have been planted as well as flower beds. It is an excellent example of sound public and employe relations policy.

Acquires Asbestos Deposit

CANADIAN JOHNS-MANVILLE CORP., LTD., has purchased an additional ore deposit in Reeves Township, in northern Ontario, which is located near the company's recently completed Munro mine and processing plant. The company is also directing the development of asbestos ore properties in Southern Rhodesia where a new plant is under construction with operations expected to start in early 1954. Other current expansion includes a new processing plant at the Jeffrey mine at Asbestos, Que.

Vermiculite

ZONOLITE CO., Chicago, Ill., recently revealed plans for new milling operations in Libby, Mont., and Enoree, S.C., to increase vermiculite mining production. New milling methods reportedly will enable the company to extract vermiculite from deposits which previously were not considered economical to mine. This will insure an adequate supply for any foreseeable future need, according to Andrew T. Kearney, company president. The company also owns or licenses 36 processing plants throughout the country.

Georgia Mica

SEVERAL GEORGIA MICA MINES which were operated during World War II have recently been reopened, in addition to the prospecting and development of several new deposits. The mining activity is centered principally in an area around Yatesville, Barnesville and Thomaston. Many deposits of high-grade ruby sheet mica have been reported. Georgia miners, operating about 25 mines and prospects, ship their product to Spruce Pine, N.C., where the federal government has set up a government purchasing depot for the purpose of building up the national mica stockpile. Present government purchase price varies from $3 a lb. to $4 an oz., depending upon quality and size.

Chemical Industries Exposition

THE 24TH EXPOSITION of Chemical Industries will be held November 30 to December 5, 1953, at the Commercial Museum and Convention Hall, Philadelphia, Penn. A substantial increase in exhibit area reportedly will make it the largest display of its kind ever held. In addition to former exhibitors, over 100 new exhibitors have engaged exhibit space, and a record-breaking audience is anticipated. The exposition is under the management of International Exposition Co., New York, N.Y., of which Charles F. Roth is manager, and E. K. Stevens is associate manager.

Lightweight Aggregate Plant

OKLAHOMA LIGHTWEIGHT AGGREGATE CO., a subsidiary of Texas Industries, Inc., Dallas, Texas, is building a $250,000 Haydite, lightweight aggregate plant, east of Choctaw, Okla., to serve the Oklahoma City area.

Sand and Gravel Plant

GLACIER SAND & GRAVEL CO., subsidiary of Permanente Cement Co., Oakland, Calif., is building a new sand and gravel plant at Steilacoom, Wash., to serve the Puget Sound area. Capacity of the new plant will be 1,000,000 tons per year.

Plant Modernization

GRANITE ROCK CO., Logan, Calif., recently completed an $80,000 modernization program at its Logan quarry, to step up efficiency in meeting specifications. New screens, conveyors and other equipment were installed.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 23,399,000 bbl. of finished cement in May, 1953, as reported to the Bureau of Mines. This was an increase of 7 percent compared with the output in May, 1952. Mill shipments totaled 22,924,000 bbl., a decrease of 2 percent from the May, 1952, figure, while stocks were 9 percent above the total for the same month in 1952. Clinker production during May, 1953, amounted to 23,073,000 bbl., an increase of 10 percent compared with the corresponding month of the previous year. The output of finished cement during May, 1953, came from 156 plants located in 37 states and in Puerto Rico. During the same month of 1952, 21,829,000 bbl. were produced in 151 plants.

Hydrated Lime

ASH GROVE LIME & PORTLAND CEMENT CO., Kansas City, Mo., reports that its product, "Slik," a high calcium finishing hydrated lime placed on the market about a year ago, is finding wide acceptance, especially among manufacturers of prepared and stucco finishes. The product, recommended for its plasticity and water retention, reportedly tests more than 50 percent higher in immediate plasticity than required by A.S.T.M. specifications for type "S" finish hydrate. The company developed its process of hydration after several years of experimentation in collaboration with the Mid-West Research Institute. The resulting product is claimed to give assurance against later expansion in plaster or mortar.

A.R.B.A. Directory

THE AMERICAN ROAD BUILDERS' ASSOCIATION has announced the availability of its 1953 edition of "Highway Officials and Engineers," which is a convenient, pocket-size directory containing approximately 1600 names, titles and addresses of administrative engineers and officials in the 48 state highway departments, the District of Columbia and the Bureau of Public Roads. It also contains a tabulation by states showing highway funds expended during the past year, as well as an estimate of expenditures during the current year.

An added feature is a listing of the administrative personnel of all toll road authorities now organized and functioning in the various states, as well as a complete listing of the officers and directors of A.R.B.A. and its organized divisions. The directory is available from the American Road Builders' Association, World Center Building, Washington 6, D.C., for $1 per copy.

Gypsum Plant

KAISER GYPSUM CO., INC., subsidiary of Permanente Cement Co., recently announced plans to build a $4,000,000 gypsum board and plaster plant at Seattle, Wash. The plant reportedly will be the only one of its kind within 800 miles of the Puget Sound area and thus will constitute a new industry for the Pacific Northwest. A 9½-acre site with access to the Duwamish Waterway for unloading gypsum-ore ships has been selected for the plant site. The company purchased this property about two years ago for approximately $100,000. The plant, which will consist of five main buildings and several auxiliary ones, will produce various types of wallboard, lath and exterior sheathing and hardwall plasters. The plant is scheduled to be in operation by December, 1954, with a production capacity of 100,000,000 sq. ft. of gypsum board products. Approximately 170 persons will be employed in the plant, constituting an annual payroll of over $725,000.

Kentucky Limestone

THE KENTUCKY GEOLOGICAL SURVEY recently announced the publication of Information Circular No. 3, on "High-Calcium Limestone in the Somerset, Pulaski County Area," by John A. Stokley and Frank H. Walker. The report is a preliminary release of information obtained in the course of a state-wide investigation of industrial limestones, being conducted by the Kentucky Geological Survey in cooperation with the Agricultural and Industrial Development Board of Kentucky.

A study of three properties and the surrounding geology indicates the probability of a wide-spread occurrence of high-calcium limestone of workable thickness and with reserves adequate for most types of operations. The report discusses the location, extent and nature of the deposit and quarrying conditions. Maps, charts and tables are also included.

Japanese Cement Production

JAPANESE CEMENT PRODUCTION amounted to 6,800,000 tons in 1951, which was 510,000 tons more than was produced in the previous record year of 1940. Although complete 1952 figures were not yet available, production was said to compare favorably with 1951 output, due to continued high demand for cement in both domestic and foreign markets. Cement shipments exceeded production, creating favorable market prices

Coming Conventions

August 31-September 2, 1953—A.I.M.E., Minerals Beneficiation Division, Fall Meeting, Hibbing, Minn.

September 10-12, 1953—American Concrete Pipe Association, 3rd Annual Short Course, Sherman Hotel, Chicago, Ill.

September 15-16, 1953—National Slag Association, 35th Annual Meeting, Schenley Hotel, Pittsburgh, Penn.

September 19-30, 1953—American Concrete Pipe Association, Annual Executive Committee Meeting, Castle Harbour Hotel, Bermuda

September 21-24, 1953—American Mining Congress, Annual Convention, Seattle, Wash.

September 28-30, 1953—National Ready Mixed Concrete Association, Semi-Annual Meeting of Board of Directors, Broadmoor Hotel, Colorado Springs, Colo.

September 28-30, 1953—National Sand and Gravel Association, Semi-Annual Meeting of Board of Directors, Broadmoor Hotel, Colorado Springs, Colo.

October 8-10, 1953—American Concrete Pressure Pipe Association, 5th Annual Convention and Meeting, Ponte Vedra Inn, Ponte Vedra, Fla.

October 12-14, 1953—National Lime Association, Fall Operational Meeting, Tutwiler Hotel, Birmingham, Ala.

October 19-23, 1953—National Safety Congress and Exposition, Conrad Hilton, Congress, Morrison and Hamilton Hotels, Chicago, Ill.

October 29-30, 1953—American Concrete Institute, Southwest Regional Meeting, Rice Hotel, Houston, Texas

which had increased about 50 percent from the beginning to the end of the year. The favorable market condition and prices accelerated expansion and improvement programs, in addition to the establishment of several new facilities. New plants opened in 1951 included three at Iwaki, two at Nippon, three at Onoda and one at Daiichi. Combined production of the new facilities brought an increase of production aggregating 98,000 tons per month. In addition, eight other new plants, with an estimated monthly production of 63,000 tons, were scheduled for completion in 1952-1953.

Gravel Company Sold

FOUTZ BROTHERS GRAVEL PRODUCTS Co., Farmington, N.M., formerly owned by J. C. and Virgil Foutz, has been sold to a new corporation which will operate the plant under the name of San Juan Gravel Products Co. Over $100,000 reportedly was involved in the transaction. Frank C. Glenn, Albuquerque, N.M., has been named general manager as well as vice-president of the company. John S. Sundt, Tucson, Ariz., is president.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of June and for the first six months of 1953 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded During June 1953	Sq. yd. awarded During first six months 1953
Roads	3,315,258	20,459,548
Streets and alleys	2,104,506	12,757,985
Airports	278,239	5,739,088
Totals	5,698,003	38,956,621

Shale Expanding Plant

RESCOLITE Co., Fort Smith, Ark., has started production of expanded shale lightweight aggregate. Plant capacity is approximately 50,000 cu. yd. per year. Officials of the company include Raymond F. Orr, president; George Junkin, vice-president and general manager; and Charles W. Alverson, sales engineer and technical advisor.

Leases Gravel Property

MUELLER SAND AND GRAVEL Co., Hanover, Kan., has leased the gravel deposit southwest of Hanover, owned and formerly operated by Louis Luehring of Hanover. The Mueller company also operates a washed-gravel plant along the Little Blue River, west of Hanover.

Perlite Expanding Plant

NEVADA PANACALITE, INC., has started operation of its new perlite-expanding plant at Henderson, Nev. The company uses crushed and processed ore from the Combined Metals Reduction Co. property at Pioche, Nev. Plant capacity is approximately 100 bags of expanded perlite per hr.

Ideal Cement Co.'s New Research Center

IDEAL CEMENT Co., Denver, Colo., officially opened its new laboratory and research center at Boettcher, Colo., at a special dedication ceremony, August 19, 1953.

The laboratory, built at a cost of nearly $500,000, has as its primary and guiding objective, "the making of better products and the broadening of their usefulness," according to Cris Dobbins, president of the company. In following out this objective, research will extend not only into production of cement, but also into specialized end uses of cement, and into related fields, such as the production of lightweight concrete aggregates and other products. Research, however, is to be conducted only on those subjects where insufficient information presently exists and which are specifically related to problems unique to Ideal's plants or sales areas.

An extensive research program has been developed on the basis of a survey of the company's research needs, with specific research projects to achieve these objectives worked out by George C. Wilsnack, research director, and Robert F. Blanks, research consultant of Ideal Cement Co., and general manager of Great Western Aggregates, Inc. Included in these projects is work in the fields of raw materials analysis, quality control of cement production, development of new products, and the testing of finished products in situations of actual use.

The research center is located near the Boettcher plant, one of Ideal's principal operating properties, which is centered in the company's production and marketing areas. Four major universities having engineering and research departments are located within the area.

The main laboratory units, which are housed in a 2-story, air-conditioned, concrete building containing 8300 sq. ft. of floor area, include a complete physical testing laboratory, chemical laboratory, petrographic laboratory, and specialized equipment for the analysis and study of materials going into the manufacture of cement, lightweight aggregates and of concrete itself.

A 17-in. x 12-ft. kiln and a 3- x 30-ft. kiln, fully equipped with automatic controls and recording instruments, form the nucleus of a complete pilot plant at Ideal Research Center

Research equipment also includes a complete pilot plant containing everything from kilns of two different sizes, to complete raw materials processing and grinding equipment. These facilities are housed in special service buildings adjoining the main research building. In addition, a complete machine shop, drafting room, library and office facilities are also maintained.

Head of the new research center is George C. Wilsnack. Other research staff members are Harold E. Hosticka, William E. Johnson, Wm. P. Whitney, Delbert B. Anderson, Rob Roy Cerney, Jr., W. McChesney, K. E. Palmer, Virgil C. Bartlett, Weldon Leonard, D. L. Crawford, A. H. Tilloson and Perry A. Hopkins.

New research center of Ideal Cement Co. is centrally located in the company's production and marketing area, and is near the Boettcher plant and the Denver executive offices

HH

Straightening Bent Shafts

By JOHN ZOLLINGER*

IT IS SURPRISING how few machinists know the procedure of straightening a bent shaft. Only a few days ago we received a 4-in. dia. axle, marred with actually hundreds

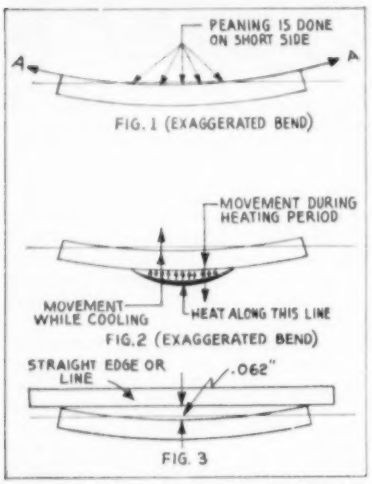


Fig. 1, 2 and 3 show steps in straightening bent shaft

of ball pean hammer marks distributed over its entire 12-ft. length. Aside from the time it must have taken to do the job, the result certainly looked like a "botched-up" job. It seems to be the common understanding that if a shaft is bent as in Fig. 1, the material along line "A" has to be elongated to force the curve into a parallel line with the axis. This no doubt can be accomplished, but it is time consuming and certainly cannot be done to a highly finished piece of work.

In describing the method used in our shop, it may be well to keep in mind that any piece of work which can be straightened by the peaning method may be handled much faster and without injury to the finish in the manner as set forth.

First of all, the principle is reversed, and in place of using a ball pean hammer, the flame of an acetylene torch is used. For the shaft shown in Fig. 1, heat is applied at the high side of the bend (Fig. 2), concentrating in the center and diminishing towards both ends. The application of heat will now further bend the shaft or, as you might say, aggravate the condition. Heating is continued until the bend is twice the original severity. For example, if a straight edge is laid along the concave side of the shaft (Fig. 3) and the greatest depth is .062 in., the heating process is continued until the gap becomes .125 in. or greater. So far we have been unable to work out a formula as to how far to go with the first heat, since each problem varies as to size of shaft, length in which a bend must be corrected, and the characteristics of the material. We have straightened drill stems 30 ft. long, 7 in. in dia., where the depth of the concave measured ½ in. and movement continued until it reached 1¼ in. It is safe to start by doubling the initial run-out and see what the first result in correction will be. Again referring to Fig. 2 and Fig. 3, let us assume, as stated before, we now have a depth of .125 in. The heat is stopped and the shaft allowed to cool. The process may be hastened by applying air as a coolant. As the shaft cools, the motion is reversed and the shaft rapidly goes past the original distortion of .062 in. and may become inactive at .015 in. With a little calculation you can probably bring it to zero with another heat. The heating should be done quickly, but care should be taken that the heat is applied without discoloring the piece of work.

To illustrate how practically and accurately this method can be used without injury to the steel or the machined finish, we take a shaft which is driven at 1800 r.p.m. by a 250-hp. motor, directly connected. Several of these shafts have been treated at our shop in the above manner with very good results.

The shaft is held between centers (should no centers be provided, it can be chucked at one end and a steady rest used at other end) and a dial indicator is placed *under* the run-out location of the shaft (Fig. 4). In this case the shaft is bent at the shoulder against the 4-in. dia. It is then revolved to find the high spot which is left in the top position. The run-out is found to be .012 in., total indicator reading; therefore, the indicator is set at .012 in. to zero. If the diameter at this point is large enough, the indicator can be left in place without damaging results from the torch, or a plate may be placed across the ways of the lathe to facilitate removing and placing the indicator. Apply heat at "A" and watch the indicator go to .012 in. past zero, or over. Stop heat and cool. The result, let us assume, will be .006 in. Repeat the procedure until the desired limits are obtained. It is possible, with a little practice, to come within .0005 in. to true indicator reading without the piece being marred. It may happen that you will go past the limit, in which case, the treatment will be the same with heat applied on the opposite side.

The method described above has been successfully used on motor shafts of various sizes or wherever the distortions are not too severe. How far you may go with this method can be learned through a little experience in your own particular field.

*Maintenance superintendent, National Lead Co., MacIntyre Dev., Tahawus, N.Y.

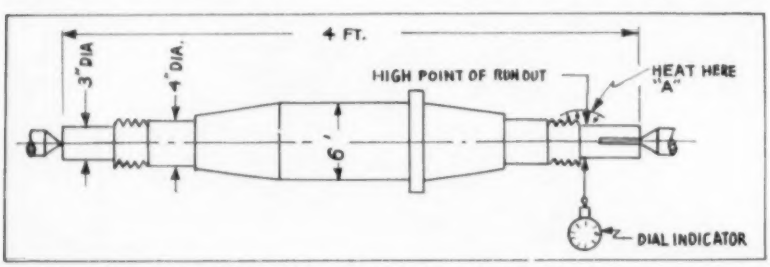


Fig. 4 shows how shaft is held in lathe; note dial indicator is placed under the run-out location of shaft

Blasting Film

A 15-MIN., 16-MM. SOUND FILM, involving unusual photographic techniques, showing modern blasting techniques adaptable to the type of rock, the surroundings, and the specific result desired, has been announced by Atlas Powder Co. The film, entitled, "The Inside Story," is available for showing before mining, quarrying and construction engineers at company meetings or in professional society sessions. The film explains the principles of blast detonation, discussing the practice of millisecond delay blasting and its application in alternate velocity loading. Supplementary slide films showing special types and methods of blasting in sequence pictures are also available.

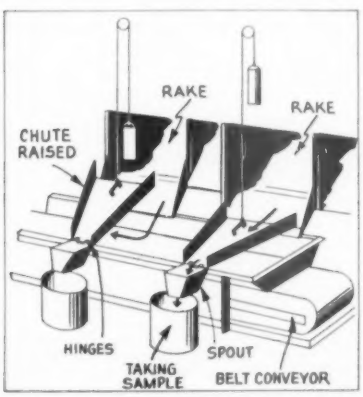
Sampling Sand

TWO BASIC RULES have been established for adequate and proper sampling in the rock products industries: Part of the stream of material should

Sand is recovered by 8-ft. duplex rake dewatering unit with a liquid cyclone mounted over it to recover added fines

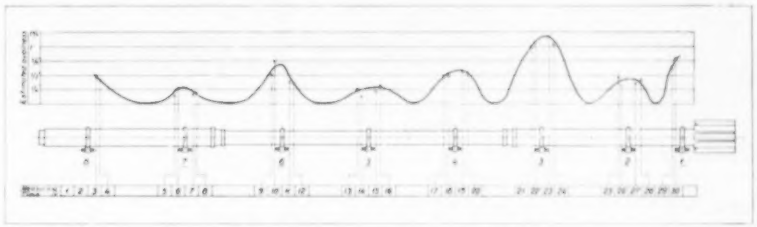
be sampled all the time, or in other situations, all of the stream of material part of the time.

At an important dam under construction by the Corps of Engineers, U.S. Army, the latter system for sampling sand was chosen. The sand is recovered by an 8-ft. duplex rake dewatering unit with a liquid cyclone mounted over it to recover added fines. The cyclone discharges into the rake unit near the upper end. This is calculated to give some mixing with other coarser sand. To get a sample, two hinged scoop-spouts have been mounted near the discharge end of



By lowering upper end of hinged scoop-spouts, mounted near the discharge end of rake, the sand can be spouted into the sampler can

the rake. By lowering the upper end of the scoops, all of the sand can be spouted into sample can. Counterweights keep the scoops in a non-operating position when not required. Normally, the sand from the rakes discharges to an off-bearing stacker-belt system designed for a minimum of 72 hr. of drainage time.



Deformation measurements of a 480-ft. kiln

Kiln Deformation Gauge Eliminates Down-Time

AB CEMEX, Stockholm, Sweden, recently announced the development of the "Shelltest" deformation gauge, a 33-lb. instrument which is said to measure deformations of kiln shells quickly, easily, accurately, and without expensive down-time. The accompanying drawing illustrates the results of one of the measurings of a 480-ft. long kiln. The ovalty at support *nr* 3 is nearly $1\frac{3}{16}$ in. and at the most exposed part of the kiln (in the burning zone). Use of the instrument reportedly indicates in which direction the supporting rollers need to be adjusted in order to reach equal deformations and long running time.

Spotting Railroad Cars With Tractors

AMONG MODERN DEVELOPMENTS in material-handling equipment has been the introduction into the industry of gasoline and diesel tractors for spotting railroad cars. Starting loaded box-car strings from a dead standstill, with tricky underfooting varying from loose cinders to slippery ties, requires effective transmission of power to the driving wheels. Deep tractor treads, efficient weight distribution and maximum performance from all available horsepower are important factors. The tractor shown in the illustration has been equipped with the industrial version of the new Fuller torque converter coupling which, in addition to reducing shock loads, is said to eliminate stalling and lugging, by automatic adjustment of torque

Torque converter coupling reduces shock loads, eliminates stalling and lugging by automatic adjustment of torque multiplication according to requirement for power at driving wheels

multiplication (up to 2.1 to 1), according to the requirement for power at the driving wheels.

Belt Tripper

AN OPERATOR in the Southwest stockpiles sand in three piles over a reclaiming tunnel. Only one size of sand is prepared at a time, permitting ample drainage time. The method of discharging the belt over the piles entails the use of a scraper-board that can be moved along the belt as desired. The scraper is edged with a piece of old belting. The life of the belt was said to be as long as other belts in the plant. This belt, as are all the others in the plant, are powered by U.S. Gearmotors.

Sand is discharged from belt by means of a scraper-board

NEW Machinery

Crawler Shovel-Crane

SCHIELD BANTAM CO., Waverly, Iowa has announced a ⅝-cu. yd., 5-ton rated crawler-mounted line of cranes, back hoes, draglines, shovels, clamshells, pile drivers and magnet cranes, designated Model C-35.

The new crawler-type model is now in production as well as the truck-mounted Bantam which can be used with a customer's truck, a factory rebuilt truck or with the company's special crane carrier. It has two-speed independent travel, enabling the operator to work a front-end attachment while traveling and swinging the machine, all simultaneously; the undercarriage is designed with a heavy-duty main frame and deep, rigid side rails; six track rollers provide even distribution of load weight over the entire track assembly; drive-power, through chain and jaw clutches, is used for each track; and a "twin-swinger" drive arrangement, plus fast-acting mechanical controls and jaw clutches, enable the operator to enter turns with split-second pause and return to straight-line travel after the turn without stopping.

This model has low ground-bearing pressures with either of the two standard size pads; 5 p.s.i. with 16-in. pads and 3⅓ p.s.i. with 24-in. pads. Equipped with 16-in. pads, it has an overall width of 94 in., thus meeting highway transportation requirements without special road permits. It weighs 15,522 lb., including 1400-lb. counterweight, but without a front-end attachment. The long track frame is said to give added stability with greater flotation for working in soft earth or swampy conditions.

It also features a streamlined basic unit cab with a hinged metal door above the operator's section which can be swung open for increased visibility when working with a crane boom, and sliding panel, safety-glass equipped windows allow extra ventilation for the operator.

Crane, dragline, back hoe, shovel, clamshell, magnet, wood grapple or pile driver attachments made by the company are interchangeable for use on either the C-35 crawler or the T-35 truck-mounted machine. Concrete buckets, orange peel type buckets or stone-breaking balls can be operated with either machine.

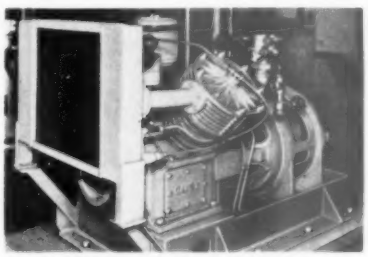
Bulk Cars With Airslides

GENERAL AMERICAN TRANSPORTATION CORP., Chicago, Ill., in cooperation with Fuller Co., Catasauqua, Penn., has developed the "Airslide," a railroad freight car for bulk shipping of powdered materials. Loading is done through hatches in the car roof leading to the bins, which have sloping sides and porous fabric linings. For unloading, each bin is tilted and an air blower feeds compressed air into a U-shaped channel built into the car bottom. The air is then forced through the porous fabric lining at a pressure of approximately 1 p.s.i., thus aereating and fluidizing the commodity for easy flowing to the unloading valves at the bottom of the car. The air blower is not standard equipment and must be furnished by the shipper. The freight car is available in sizes of 2000, 2600 and 3600 cu. ft., and is built to suit a range of commodities of varying densities.

Crawler-mounted shovel in operation at a sand and gravel pit

Air Compressor

DAVEY COMPRESSOR CO., Kent, Ohio, has introduced a stationary air compressor, known as Model 25D. Available with constant speed or start-and-

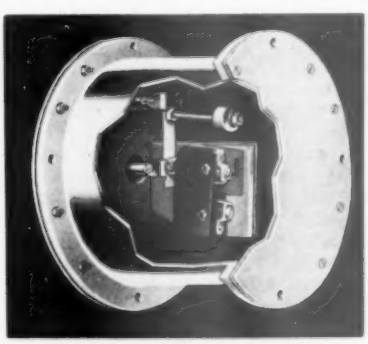


Stationary, 25-hp. air compressor

stop pushbutton controls, the unit has a displacement of 128 c.f.m., and is directly connected to a 25-hp. electric motor. It is a V-type design with low pressure and high pressure cylinders. Standard equipment includes an intercooler with a safety valve, air pressure regulator and unloaders. It is 62 x 38 x 38 in. and weighs 1635 lb.

Bin Level Indicator

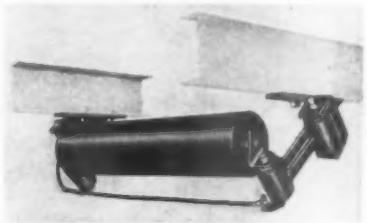
THE BIN-DICATOR CO., 48-13946 Kercheval, Detroit 15, Mich., has announced a bin level indicator which is a refinement of the original Bantam Bin-Dicator. It is so designed that it may be mounted on the outside of thin-walled bins, inside of thick walled or multiple compartment bins, or suspended within the bins. The 4-in. flexible diaphragm is available in various types of material, thus making the indicator applicable to almost all free-flowing bulk materials. The diaphragm actuates a Micro switch, and a back plate and counterweight limit the diaphragm travel to the minimum required to actuate the switch. The unit has no springs or motors and no lubrication is required, thus providing minimum maintenance problems.



Cutaway of bin level indicator

Self-Aligning Return Idler

CHAIN BELT CO., Milwaukee 1, Wis., has developed a belt training, or self-aligning, return idler. Designated Rex Style No. 41, it provides automatic

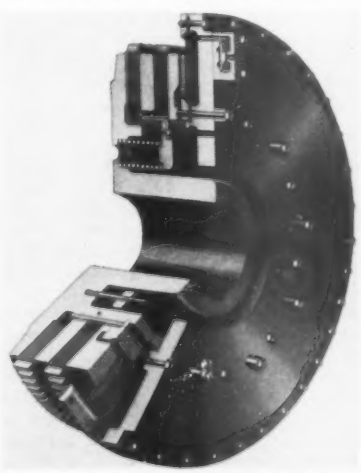


Self-aligning return idler does not require side-guide idlers

alignment for the return belt without the use of side-guide idlers. It consists of a dead-shaft, roller-bearing return roll, mounted at each end to a toggle-like arrangement of swivel arms suspended from the conveyor framework at an approximate 45 degree angle in the direction of belt travel. Increased weight on one side causes that end of the roll to move forward and downward, while at the same time the opposite end of the roll is moved backward and upward, thus guiding the belt back to the central position. Because of its principle of operation, the idler operates in one direction only. The idler is furnished with standard 5- or 6-in. dia. steel return rolls.

Air-Actuated Clutches

TWIN DISC CLUTCH CO., 1361 Racine St., Racine, Wis., has introduced Model PO, a series of air-actuated clutches designed to handle higher torque capacity loads. Narrow clutch width permits the unit to be installed with closer shaft-bearing center distances in small shaft space. Air actuation is effected through insulated and air-cooled diaphragms, and a set of air-cooled springs are incorporated for quick, positive plate release and equal distribution of release pressure. All parts are fabricated from special alloys for maximum strength to withstand heavy shock loads and tooth wear. The clutch is available in two and three plate, 24-in. size and is designed to fit any job where remote control is desired.



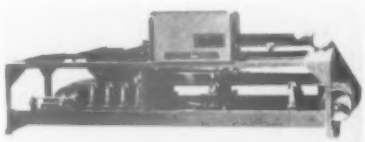
Cut-away of air-actuated clutch

Metal Detector

RADIO CORP. OF AMERICA, RCA Victor Div., Industrial Equipment Section, Camden, N. J., has developed a metal detector, specially engineered for use in quarries and various mining industries to detect magnetic or non-magnetic tramp metal large enough to damage crushing machinery. The equipment is generally installed between the primary and secondary crushing operations and consists of two units; the detector which frames the aperture through which the conveyor carrying the product passes; and a small control unit. The detection aperture is weatherproof for outdoor operations and is made to suit a variety of primary belt conveyors. The frame is so designed that it can be separated into two parts for installation and rejoined around the belt. The electrical charge induced by the passage of metal may be used to activate a signaling device, or to stop the conveyor belt to prevent the metal from reaching the secondary crusher. The detector is said to give satisfactory performance at conveyor speeds of up to 600 ft. per min. The 6¾- x 10-in. portable unit weighs approximately 20 lb., and operates on 115 volts, 50-60 cycles, and consumes approximately 70 watts.

Conveyor Scales

SINTERING MACHINERY CORP., Transportometer Div., Netcong, N. J., has announced a line of continuous, automatic weighing scales. These include the Transportometer, for installation on belt conveyors; Transportoweigher, a weighing and conveying unit; and Transportofeeder, a feed regulating, weighing and conveying unit. All employ a mechanical, gear-differential weight integrator which



Feed regulating, weighing and conveying unit

automatically and continuously records the product of the varying conveyor belt speeds and the momentary weight, per foot of belt, passing over the scale suspension.

Kit for Testing pH Value

FISCHER SCIENTIFIC CO., 717 Forbes St., Pittsburgh 19, Penn., has brought out the Alkacid pH Test Kit containing a long-range alkali-acid tester in a patented vapor-resistant plastic dispenser and a kit of short-range papers. The tester is used to find the approximate alkali-acid range, which is then matched to an appropriate short-range paper to determine the exact pH value. The paper is moistened and matched, while wet, with a color key printed on the plastic dispenser. The entire pH scale of 0 to 14 is divided into distinctive colors for each half unit, and permits estimations to one-fourth unit or closer.

Underground Shuttle Truck

DART TRUCK CO., 27th & Oak, Kansas City, Mo., announced the release of a 60-in. high truck for underground operations. It is powered by a 275-hp. diesel engine, enabling it to travel almost 30 m.p.h. on smooth terrain. The engine drives a torque converter with a fully reversible transmission, allowing operation either forward or backward. A set of dual controls permits nosing the truck into a work area for loading, and then, by swiveling the seat, driving in the reverse direction in a shuttle operation. An apron-type conveyor at the truck bottom is powered by a reversible hydraulic motor to unload at rates up to 60 f.p.m. The engine exhaust passes through a "scrubber" to render the gasses harmless. The truck design is such that the diesel power plant may be substituted by an electric motor.

Shuttle truck with reversible transmission

AN "AUTOMATIC" SAND AND GRAVEL

Holliday Sand & Gravel Co., builds completely modern plant with central control house for all operations

LOCATED ON THE NORTH BANK of the Kaw River at Forest Lake, Kan., two miles from Bonner Springs, and about 18 miles west of downtown Kansas City, Mo., is the new plant of Holliday Sand & Gravel Co., a division of the List & Clark Construction Co., Kansas City, Mo.

The old plant, some 350 ft. distant, was established by the Welch Sandler Sand Co. back in 1933. In the passing years, closeness to the river made the location somewhat hazardous. The 1951 flood, which created such havoc in the valley, left the plant untouched, but took out 100 ft. of river bank and about 800 ft. of tail track. A costly rip-rap job to secure the bank for the future has been only recently completed. Adjoining bank protection to the west on the Union Pacific Railroad's right-of-way was also provided at the same time by the railroad company. Rock was obtained at a quarry located two miles away in an area of large limestone deposits.

Push-Button Operation

By reason of more exacting state and federal government sand specifications and also by the dislocation caused by the 1951 flood, a new plant was started in midsummer of 1952 and completed in February of this year. It is a completely packaged, push-button operation, engineered and equipped by Eagle Iron Works. The two steel conveyors, set on 45-ft. steel towers, each 416 ft. long, were furnished by the Universal Engineering Co., Cedar Rapids, Iowa. Erection work was done by the Holliday Sand & Gravel Co. under the direction of Superintendent Dewey Schlup who spent 12 years with the predecessor company and 10 years with the present owners. He is proud of a no-accident safety record during all of the construction period.

A new 400-hp. motor and new Amsco pump are on the ground for replacement of present barge equipment together with the present Swintex digger anchored off shore from the plant which has a 12-in. suction pump and 10-in. line to the plant. An extra 6-in. line for water supply for bearings on screw washers and for washing sand extends from the dredge to the plant. A 24-in. steel pipe line, 450 ft. long, has been installed to handle waste material from the plant back to the river.

The first overhead discharge of materials is into a pump box equipped with grissly bars and thence over a double-deck vibrating screen with ½-in. above and a No. 4 mesh below. The ⅜-in. minus gravel is recovered at that stage of the screening.

The balance of the material passes into two big scalping tanks where it is classified by flotation. It is released by seven valves on each scalping tank by pressure into cross flumes and then into a four-compartment blending flume. This permits control over amounts and classification. From this point, the material goes into two screw washers, one for fine sand and one for concrete sand. The extensive belt conveyor system elevates the finished material and distributes it to stockpile locations.

Electric power is supplied by the Kansas Power & Light Co. from a nearby substation at Bonner Springs. A central power house provides push-button control for every part of the operation. Superintendent Schlup has this to say about it: "Our central power house with two men on duty for each of the day and night shifts, with electric switches leading to all of the conveyors, screen, 5-in. water pump for washers, and to the office gives us instant control and saves endless labor; a real economy in every way. An inter-communicating system is another time-saving convenience and connects with both office and dredge. A loud speaker, just outside the power station, is operated from both office and boat and is strong enough to hail anyone in the plant area." The central control house is also equipped with a vibrating Combs gyratory sifting machine made by the Great Western Manufacturing Co. With the office laboratory, it serves to complete the double-checking system of fineness modulus.

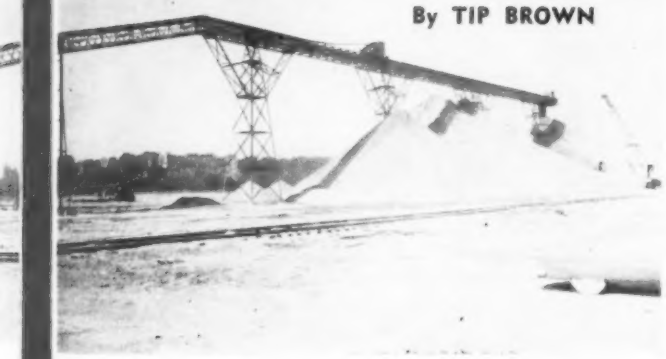
Modern Office

A new one-story concrete block office building with unusual day lighting from large windows with aluminum sash, and equipped with fluorescent lighting, acoustical ceilings, asphalt tile floors, air-conditioning, and knotty pine finish was occupied May 1. The shipping department fills the front office and handles the plant orders, including weighing of trucks on the Fairbanks, Morse springless scale. Post card notices of shipments are sent to customers daily as an important link in good shipping service. The center space is a private office for the plant superintendent, and the rear portion is a well equipped testing laboratory.

The plant is located on the Union Pacific Railroad on highway 32, an east and west, heavily-travelled, paved road. Loading is done from stockpiles by three Northwest cranes, one of 2-cu. yd. capacity, and two of 1½-cu. yd. capacity, plus a Koehring 2-cu. yd. crane. The rail track, which holds 70 cars, is served with empty open equipment brought in from the west and released with loads at the east end of the plant. The east conveyor stockpiles the ⅜-in. gravel, brick and plaster sand; the west conveyor, the concrete sand. An additional track is being laid for loading on the opposite side of the stockpiles, thus doubling the empty-car capacity of the plant.

PLANT

By TIP BROWN



Overall view of plant and stockpile arrangement

Average 8-hr. plant production is around 2500 tons of all grades of sand and 150 to 200 tons of ⅜-in. minus gravel. Fifty to 60 cars per day are average shipments in the construction season. The products are used largely on government and state highway projects, by building supply dealers, concrete block and ready-mixed concrete plants within a 175-mile radius of the plant. Concrete road and street paving is one of the principal outlets. Plant sales are directed by Ray Ulsh from headquarters in Kansas City, Mo.

Depreciation Adjustments

THE COMMISSIONER OF INTERNAL REVENUE, T. Coleman Andrews, recently announced the establishment of a new administrative policy with respect to depreciation adjustments for tax purposes, designed to reduce controversies between taxpayers and the Bureau of Internal Revenue. The new statement of policy, which seems to indicate the intention of the government to eliminate activities which are beneficial neither to employers nor the country, reads as follows:

"The Internal Revenue laws allow as a deduction in computing net income a reasonable allowance for depreciation of property used in trade or business or of property held for the production of income. The purpose of the deduction is to permit taxpayers to recover through annual deductions the cost (or other basis permitted by law) of the property over the useful life of the property. The determination of the amount of the deduction is largely a matter about which there may be reasonable differences of informed judgment, but the impact on the revenues resulting from these differences may be negligible one way or the other over the years involved.

"Accordingly, effective May 12, 1953, and as respects all open years for which agreement as to the tax liability has not been reached at any level within the Internal Revenue Service as of that date, it shall be the policy of the Service generally not to disturb depreciation deductions, and revenue employes shall propose adjustments in the depreciation deduction only where there is a clear and convincing basis for a change. This policy shall be applied to give effect to its principal purpose of reducing controversies."

Acquires Properties

THE GEORGIA MARBLE CO., Tate, Ga., which has been in operation since 1884, recently announced the acquisition of Tennessee Marble, Inc., Knoxville, Tenn., Green Mountain Marble Corp., West Rutland, Vt., and St. Genevieve Marble Quarries, St. Genevieve, Mo. These properties were purchased by issuance of preferred and common stock. James R. Cowan, president, stated that the acquisition of these companies, together with the comparatively recent purchase of Alabama Limestone Co., Rockwood, Ala., is another important step in the company's long-range expansion plans to present the construction industry its other customers with a most complete service.

The company also reports that its recently developed Calcium Products Division, which produces both finely ground high-calcium marble and Georgia Marble chips, has found a very broad market for these materials which are used in many manufactured products, including paints, asphalt and rubber floor tile, tires and various other rubber goods, ceramics, etc., as well as sparkling-white marble roofing stone chips known as "Whitetop." Due to the large demand for these products, the company has had to enlarge its facilities several times.

Safety For Small Plants

THE SMALL DEFENSE PLANTS ADMINISTRATION, Washington 25, D.C., recently completed a series of six pamphlets designed for the purpose of aiding small plants to set up an effective safety program. Subjects covered in the series include the following: Reducing Accident Costs in Small Industrial Plants; Cost of Accidents; Basic Principles of a Safety Program; Reducing Accident Costs Through Safe Working Conditions; Reducing Accident Costs By Use of Safety Committees; Membership and Guidance of Safety Committees; What Precautions Are Necessary; Functions of Safety Committees; Benefits to Both Management and Labor; Reducing Accident Costs Through Reports and Records; Reducing Accident Costs Through Safe Work Methods; and Reducing Accident Costs Through Selling Safety to Supervisors and Workers.

Cement Plant Expansion

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has announced a second expansion program at its Cape Girardeau, Mo., plant. Company directors have approved capital expenditures of $550,000 covering the project, which will include the installation of an additional kiln and related equipment. Earlier expansion this year increased production at the Cape Girardeau plant by 100,000 bbl. per year. When the present expansion is completed, annual capacity will be increased to 1,850,000 bbl.

Twenty railcars of rip-rap daily are loaded at a rail spur near Wilton, N.D., for a 50-mile haul to the earth-filled Garrison Dam site. As there are no quarries in the region, rock is dozer-raked out of fields, trucked to spur and loaded on cars by an International TD-18A crawler tractor and loader, owned and operated by Northern Improvement Co., contractor for the project

BATCHING Bulk Cement for Truck Delivery

By BROR NORDBERG

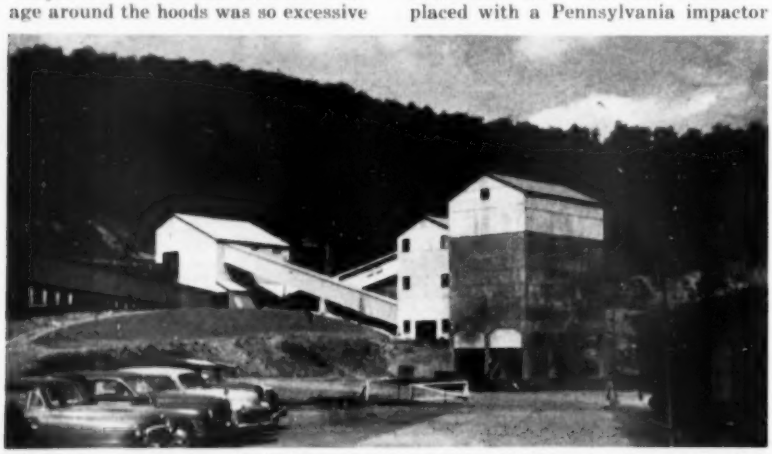
Penn-Dixie operates its own fleet of 34 bulk cement trucks, hauling 72 bbl. of cement to a load, which deliver over a 100-mile radius from the plant. More than one million barrels of cement were delivered in bulk cement trucks in 1952

WHEN PENN-DIXIE CEMENT CORP. took over the West Penn Cement Co. plant at West Winfield, Penn., in 1949, the company set out on a modernization and rehabilitation program that resulted in the expenditure of five million dollars and took three and one-half years to complete.

The original plant was built in 1926 as a one-kiln wet process mill. A second kiln was added in 1928 to bring rated production up to 4000 bbl. of clinker per day. These kilns were 11½ ft. in diameter and their lengths were 250 and 257 ft. One had an enlarged diameter calcining zone. They were exhausted through a breeching into dust chambers and had no stack or effective means of draft control. There were no heat exchangers in the drying zones and the kiln shells were warped with the result that air leakage around the hoods was so excessive that there could be no uniformity in firing. Necessary instruments were lacking and could not be effective if they had been available.

Clinker was discharged from the kilns through rotary coolers which were far from adequate when kiln production was forced beyond normal capacity. These coolers actually would become red hot when changes were made to increase clinker production in the kilns with the result that kiln capacity could not be approached, and the installation of more effective coolers became mandatory.

Three compartment mills did the raw grinding in open circuit. They were fed from individual feed bins supplied with roughly proportioned hammer mill product from a 42- x 48-in. hammer mill located in the raw mill. This unit has since been replaced with a Pennsylvania impactor operating in closed circuit in the new crusher layout later described. There was little control of the size of feed to the compartment mills originally, so that output of the mills was far less than their potential capacity. There was no adequate raw material storage.



Left to right are primary crusher building, secondary crushing building and bulk cement batching plant for trucks

Clinker was stored in two 8000-bbl. concrete silos. A roll crusher reduced the clinker to ½-in. top size ahead of the mills. Final grinding was accomplished in two three-compartment mills although milling output was far short of requirements.

The stone crushing plant was inadequate. There were no means of conveying stone from the stone crushing plant to the raw mill excepting in hopper bottom cars handled by a locomotive and a locomotive crane.

Slurry mixing tanks and kiln feed tanks were adequate, with minor changes, but there was need of new handling equipment for finished cement.

The foregoing is only to point out some of the major problems that confronted Penn-Dixie engineers and operating executives as they set out to modernize the plant, and to accomplish the job with minimum interruption to cement production.

Included in the rehabilitation program were the building of a completely new stone crushing and screening plant; installation of a long belt conveyor system for delivery of raw materials into storage; construction of ten new reinforced concrete silos for storage of limestone, shale, sandstone and clinker; a belt conveyor system and feeders for blending limestone; a new arrangement for proportioning raw materials; changes to

Penn-Dixie Cement Corp., operates own fleet of 34 trucks at West Winfield, Penn., plant. Major rehabilitation program completed affecting all mill departments

Garage facilities for servicing and overhauling bulk cement truck equipment built close to mine entrance. Worked-out rooms in mine are used for garage

the raw grinding mills to increase production; rebuilding of the kiln shells, kiln hood, feed end and installation of heat exchangers; installation of unit coal mills, concrete stack and air-quenching clinker coolers; complete instrumentation for firing control; conversion to two-stage grinding in the finish mill; new cement transport and handling equipment; a completely new department for the manufacture of high early strength cement and mortar cement; new shop buildings; a modern washhouse and locker rooms; and a new air-conditioned office building and chemical laboratory. In addition, a new hauling system from the mine to the crushing plant has been installed and the mining operations are in process of further mechanization. Roadways in and around the plant have been paved and the grounds beautified.

West Winfield is practically a company-owned village some 12 miles southeast of Butler, Penn., in mountainous country. The town, too, was modernized by installation of a sewage disposal plant and 80 g.p.m. water purification plant, which includes equipment for iron removal and water softening.

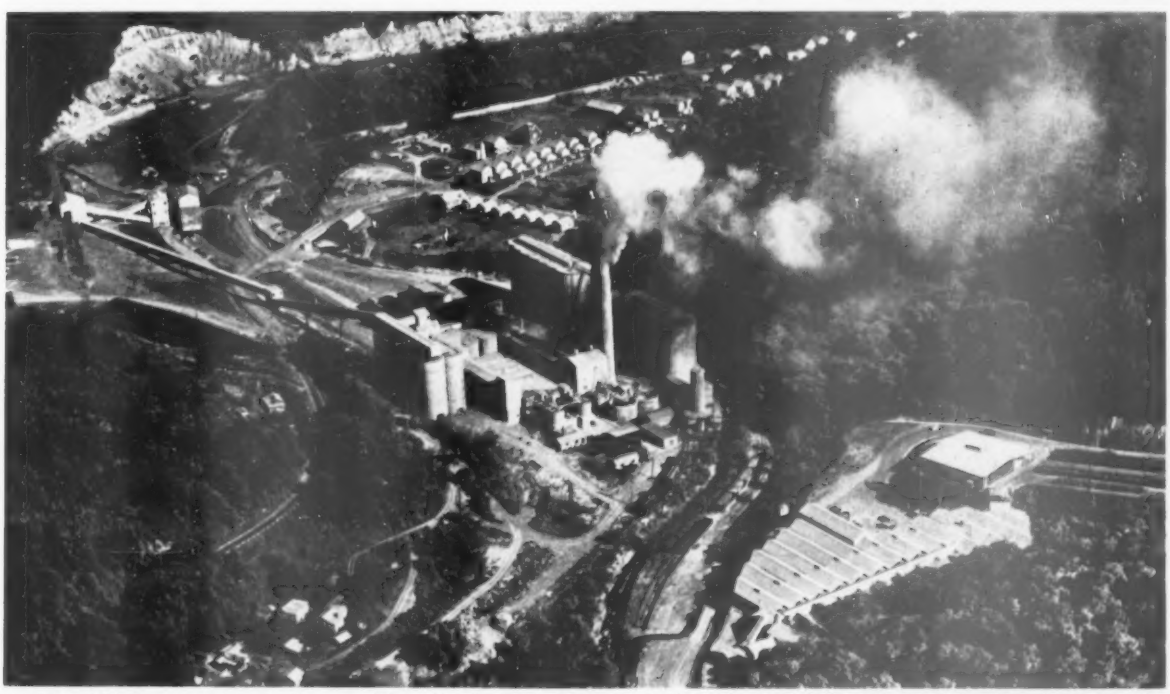
Rail connections from the cement plant at West Winfield to the Pennsylvania Railroad at Freeport, Penn., are provided by the Winfield Railroad Co.

Net result of the plant rebuilding was to reduce operating costs substantially, improve the quality of cement, increase mill output and provide much better customer service.

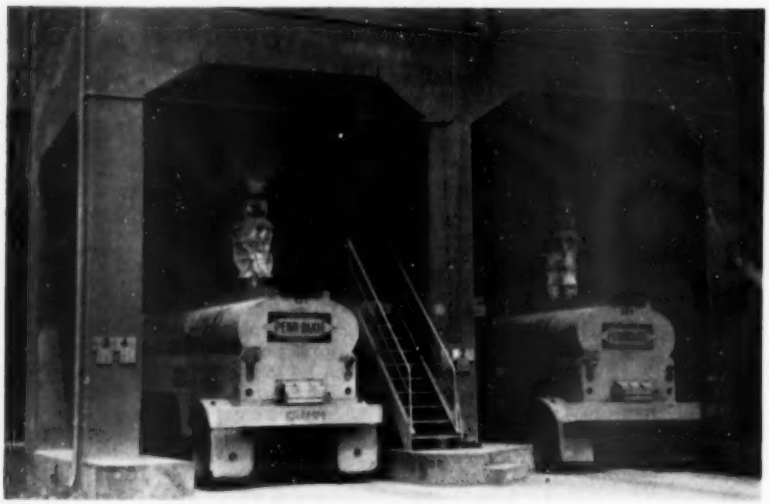
Stone is mined instead of quarried. Coal is available at relatively low cost from local strip mines. Consumption has been reduced somewhat due to the kiln changes and improved firing practice. Power consumption has been cut from 28 kw.h. per bbl. of cement to about 22 kw.h. principally due to improved grinding and crushing methods. Output of the plant has been increased by 30 percent to 5200 bbl. per day. Facilities now exist to manufacture all standard types of cements.

Bulk Cement Trucking

West Winfield is located on The Winfield Railroad which is about 13 miles long and is a wholly-owned subsidiary of the Penn-Dixie Cement Corp. and connects with the Pennsylvania Railroad at Freeport, Penn., on the Allegheny River. In May, 1950, when Penn-Dixie Cement Corp. found it was difficult to secure an adequate



West Winfield plant as it appears after completion of modernization program. Crushing plant and bulk cement truck batching plant are at far left background. The mine is to the left of crushing plant (not seen). Note long belt conveyors to carry stone to new silos. Village of West Winfield is in background



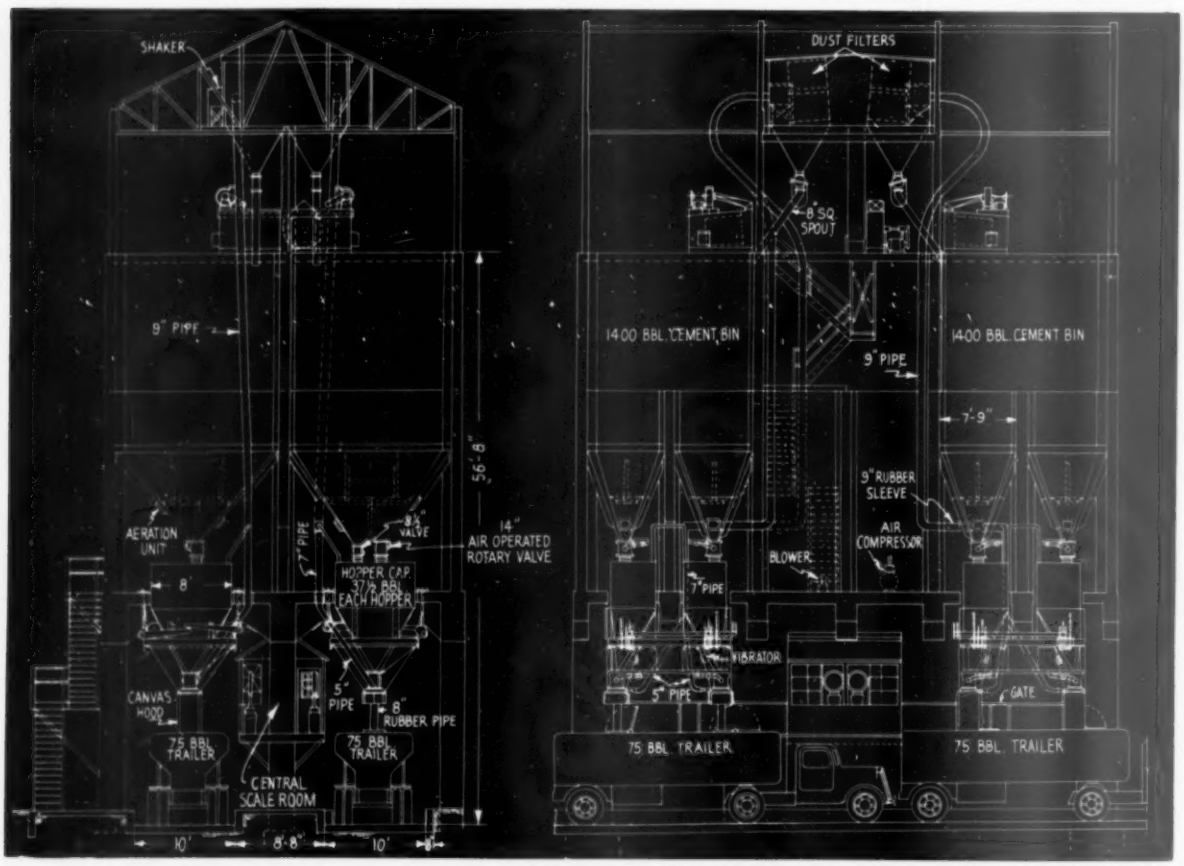
Four bulk cement trucks may be loaded simultaneously

Bulk cement loading operation, looking toward truck entrance

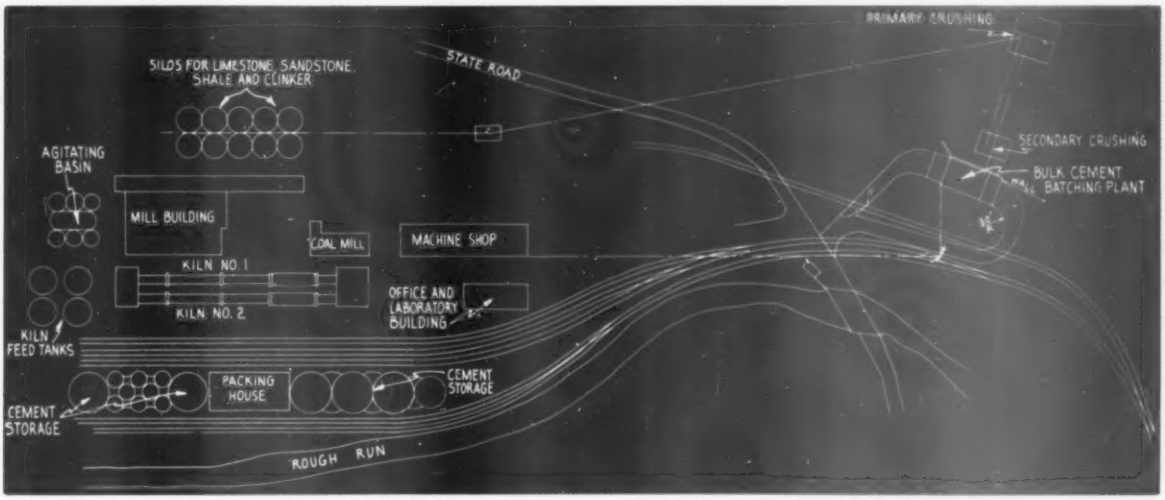
supply of bulk cars and freight cars for rail shipment and also found that nearly all the other cement manufacturers in the western Pennsylvania and Ohio area were delivering cement by truck, Penn-Dixie started trucking with bulk trucks with air slides for quick unloading and, of course, regular flat rack trucks for delivery of cement in paper bags to customers. In 1952 over 77 percent of Penn-Dixie's total shipments out of West Winfield moved by truck. Penn-Dixie owns and operates its own large fleet of both bulk and package delivery trucks and uses leased trucks which they operate themselves, however, only during peak rush seasons. The company maintains complete garage facilities to handle all maintenance and overhauling except for major jobs like reboring of engine cylinders. The repair shops are built close to abandoned mine entrances and the worked-out rooms inside the mine provide garage facilities for storing trucks during the off season.

Bulk Loading

The existing stone bins in the old crushed stone plant were adapted to the storage of cement for bulk load-



Composite section elevations of batching plant for bulk cement trucks. Trucks are hauling 72 bbl. of cement per load



General plot plan of the mill. Bulk cement batching plant for trucks is away from mill working area

ing of trucks. This involved increasing the height of the bins to provide sufficient storage and necessary structural changes to accommodate the required equipment. This plant is located away from the mill working area some several hundred feet which is an advantage. It was desired to keep the bulk loading, with its traffic, separate and away from the plant, although in event of emergency, trucks can be loaded from the main plant silos.

In the conversion of the stone plant, four 2-hopper bins of 1400-bbl. capacity each were provided, each serving a dual suspension hopper scale which weighs and automatically discharges 72 bbl. of cement into a two-hatch bulk truck.

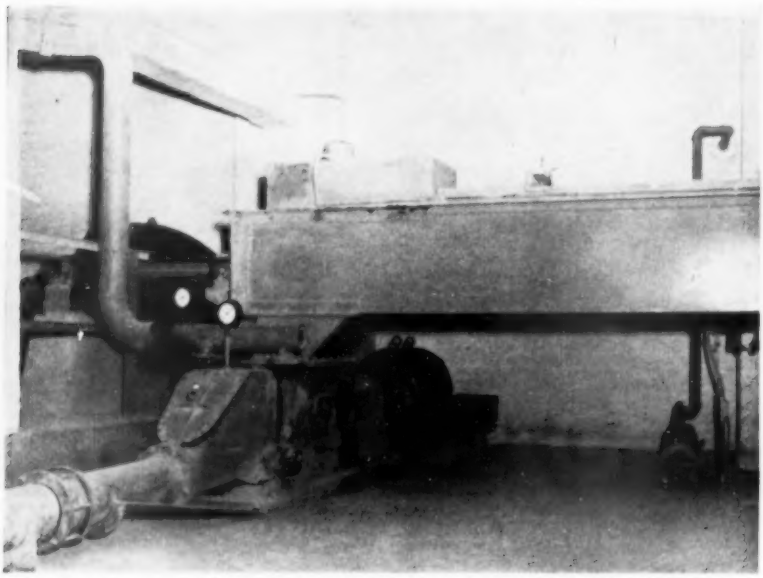
Speed and accuracy in loading were stressed in the design and the plant was designed so that four trucks can be loaded simultaneously at the rate of eight trucks per hour per scale. Weighing and loading are handled by one operator stationed in a central control house. A printed ticket with truck identification number, the scale "full" weight and the scale "empty" weight are made for each operation.

The way the plant operates, the driver spots his truck under the scale, opens the two hatches, inserts the discharge spouts and lowers the canvas hood. While this is going on, or before, the operator is filling the scale hoppers. When loaded, the driver removes the spouts, closes the hatches, gets his printed ticket and is on his way.

Timing of the cycle includes 4 min. and 15 sec. to fill the two scale hoppers consecutively, 15 sec. to print the weight and open the discharge gates, 2 min. and 30 sec. to empty both scale hoppers, and 30 sec. to close the discharge gates and print the weight. Total time is 7 min. and 30 sec.

Various types of cement are handled in the bulk loading plant. High early strength cement is loaded into bulk trucks direct from the mill stor-

Left: One operator in a central control house handles the weighing and loading for bulk cement trucks. Four trucks can be loaded simultaneously at the rate of eight trucks per hour per scale. There are four suspension hopper print-weigh scales. Right: Batching plant for bulk cement trucks is located adjacent to crushing plant, away from mill working area



Cement pump for delivery from storage silos to batching plant for bulk cement trucks

age silos in the plant proper.

It was necessary to install two separate Fuller-Kinyon systems in the main plant stockhouse for the transfer of cement to the bulk loading bins. Each consists of the necessary screw conveyors to a 7-in. type H pump with individual C-300 F rotary compressor, and delivers cement at the rate of 300 bbl. per hour into the bins. Transport lines are 8-in., 1100 ft. in length, with a 55-ft. rise.

Cement is drawn from each two-hopper bin through two 14-in. diameter Blaw-Knox rotary charging valves and an 8½-in. rotary dribble valve. Also, there are two 14-in. diameter Blaw-Knox rotary discharge valves to release the cement from the scale hopper. These valves are air-operated and electrically controlled by 4-way solenoid valves. Valves rather than vane feeders were chosen because of their speed and because they will not flush.

The scales are suspension hopper print-weigh Toledo scales (4), 50,000-lb. capacity, with graduations in 50-lb. increments and recording to the nearest 25 lb. They each have a photo-electric cutoff to operate the rotary valves serving two hoppers.

Dust collection was provided to alleviate the pressure on the cement bins while being filled and to suppress dust at the scales. So that there will be no contamination between cements, either during the filling or weighing operation, the arrangement of dust collectors is such that cement collected will be returned to the same bin from which it was drawn.

Electric crane with 30-ft. boom and working platform is used for scaling and for drilling ceiling holes and high face holes

Four small package dust filters (Sly) alleviate the F-K system, each with individual fan and shaker. Their operation is automatic, so that the fan will start automatically when the cement starts to flow into a bin. When the pumping of cement stops, the collector fan will stop and, after a short interval, the shaker will operate for a short period and then automatically stop. This is accomplished by a pressure switch on the main line and control relays operated by the direction of flow as indicated on the F-K two-way valves.

Dust collection for the scales is provided by four Sly units. These units are so designed that cement collected by them may be returned to the individual bins from which the cement was drawn. There is a single 15-hp. fan to furnish suction at all scales while weighing is in progress. At a convenient time the fan may be stopped when the timer will automatically operate the shaker motors for a given period.

Each bin is aerated by Fuller aeration units with capacity of 12 c.f.m. at 2-in. w.p. A Roots Connorsville blower, rated at 50 c.f.m. and 5 p.s.i., supplies the low pressure air for this application. Should a bin run low or the flow of cement be retarded, as the operator will note on the scale indicator, he opens a valve overhead and starts the blower. He can shut it off or run it continuously.

High pressure air for rotary valve operation is supplied by an Ingersoll-Rand air compressor, rated to supply 13.2 c.f.m. at 80 p.s.i. In addition, there are V55 Syntron electric vibrators on each bin hopper, to be used if needed for clean discharge.

The operator has at hand all the necessary pushbuttons, valves for air agitation and switches for electric vibrators. To begin operations, he presses a button to start the necessary relays and solenoids which actuate the various operations in sequence. The discharge of the scale is the only manual operation required. He, of course, must close a switch to start the electric vibrators, and turn a valve to start bin aeration. If power should fail during the weighing cycle, all valves will close and it is simple to pick up where weighing had stopped. Discharge into the truck hatches is through 28-in. canvas hoods.

The bulk truck fleet, owned and operated by Penn-Dixie, consists of 34 Gramm trailers (model DF85) mounted on White tractors. They are rated to carry 75 bbl. of cement and 97 bbl. of mortar cement but loads of cement are held to 72 bbl. This is a live load of 27,100 lb. The total weight limit in Pennsylvania is 45,000 lb.

The trailers are of the aerated type with Fuller-Huron airslides for discharge. In unloading, the body is elevated to a slope of 4 deg. by a hydraulic lift at the cab end, and a valve is turned to supply low-pres-

sure air to the airslides which is furnished by a small blower with 5½-hp. gasoline engine drive. A load is discharged in 5-10 min.

Mine

Limestone, shale and sandstone all come from a single mine. Limestone is from the Vanport formation which is generally characterized by a uniform composition. However, sandstone comprises the ceiling with occurrence of shale at some locations. This condition, at times, requires selective mining for which excellent handling and blending facilities exist. Shale and sandstone are mined at intervals as needed to fill the storage silos, but limestone is mined at four working areas and loaded by four electric shovels in order to get out sufficient stone. Shovels are 1-cu. yd. machines with short booms and dipper sticks.

The mine is being worked in the conventional room-and-pillar pattern, and has 30-35-ft. rooms and an 18- to 22-ft. high ceiling. Collecting locomotives haul trains of six cars of 7 tons each, from loading points in the various headings to the main haulageway where trains of 24 cars are made up for transportation out of the mine to the crushing plant. These trains are hauled a distance of about 1¼ mile by a new 15-ton General Electric locomotive over a trolley system. A round trip requires 20 minutes.

Quarry haulage is to be still further mechanized by substitution of two Joy shuttle cars for the gathering locomotives, which will eliminate much of the labor of track-laying and maintenance. This will require forced ventilation and the erection of brattice walls blocking off the working areas. A scoop-front loading shovel (1¾ cu. yd.), model TL-15 Lorain, with 1¼-cu. yd. bucket, will also be put into service to step up production. This is a low-headroom shovel with extendible boom that may be pushed out a distance of 7 ft.

A new Lorain electric crane, with 30-ft. boom and a 3½- x 6-ft. working platform supported from the end of the boom, recently went into service for scaling and for drilling ceiling holes and high face holes. Previous practice was to use wood benches. The drilling pattern is being changed to use of a V-cut, drilling from a Jumbo rig, and shooting of 40 holes per round to advance 12 to 14 ft. into the working faces. Then, each shot will be loaded out before the next is made. Practice has been to shoot part of the face height and then the ceiling was carried upward, producing a muck pile covering considerable area.

A substation was installed in the mine to convert 440-volt a-c electricity to 250-volt d-c for operation of the electric shovels, when the mine mechanization program was started. The operating schedule is one shift per day for drilling, with the loading crew working the night shift.

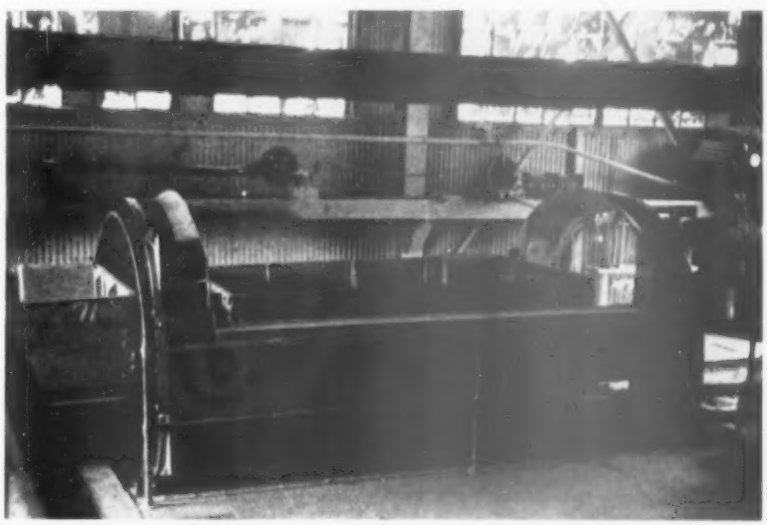
View from top of storage silos. In left, background, from left to right, are primary crusher building, secondary crushing building and bulk cement batching plant for trucks. To the right may be seen part of village of West Winfield

Crushing Plant

Prior to 1949, there was a commercial stone crushing plant at a level considerably below the elevation of the mine floor, from which stone, usually too great in size, was made available for the raw grinding mills. It required 40 cars, locomotive and crane service, operating around the clock seven days a week, to keep the mill supplied. The cars were pushed upgrade a distance of some 1000 ft. and dumped right into the grinding mill feed bins which had a total capacity of 800 tons. There was no way to control the mix proportions as the materials came from the mine except by visual inspection and guesswork. Limestone, shale and sandstone were batched into the cars at the crushing plant, and the only reserve storage was that available in the cars themselves.

One of the first major undertakings was to build a completely new crushing and screening plant and to install a belt conveyor system for low-cost delivery of sized limestone, shale and sandstone into concrete silos. These silos are new and were built not only to provide reserve storage but to permit proportioning and blending of limestone and other raw materials. The old crushing plant bins were reconstructed for cement storage and used as the nucleus to build the new, modern bulk loading plant, as pointed out earlier in this article.

The crushing and screening plant consists of a primary crushing and screening structure and a secondary crusher building, both of reinforced concrete and steel construction with cement-asbestos siding. The secondary crushing building is between the primary crusher building and the bulk



Mine cars are discharged into the primary crusher receiving hopper by a car tipper

Stone is conveyed by belt conveyor from new crushing plant to new storage silos shown in left background. Note how working areas have been paved and surroundings made to look attractive

loading plant below, and is at an intermediate level.

Cars are spotted on a car tipper for discharge into a steeply-inclined receiving hopper for the primary crusher. Each car is weighed as dumped, for a check on tonnage. There is a telephone line from the crusher building to the top of the silos so that the bin man may be notified of any change in materials going to the conveyor requiring selection of a different silo.

The primary breaker is a 30-in. Traylor bulldog jaw crusher driven by a 200-hp. motor. It is set for reduction to 8-in. top size. Product of the primary crusher is carried over a 36-in. belt conveyor (No. 1), 159-ft. centers, to the secondary crusher which is a Pennsylvania reversible impactor, size CF-15-50. It is driven through a Falk flexible coupling by a 450-hp. E.M.M. Co. .8 p.f. synchronous motor at 900 r.p.m. A 30-in. high intensity Dings magnet (1300 watt d-c) is suspended over the belt to intercept tramp iron. The secondary crusher is designed to reduce 7- to 8-in. top size stone, to ⅝ in. minus, at the rate of 300 t.p.h., while carrying a circulating load of 450 t.p.h. It is in closed circuit with two vibrating screens in parallel, the product of the crusher being put over the screens by a 36-in. belt conveyor (No. 2) on 138-ft. centers.

The screens are 4- x 14-ft., F-600 Ty-Rocks with air seal enclosure. They carry 4- x 4- x 8-ft. sections of Ty-Loy wire cloth with ⅞-in. sq. openings and 4- x 4- x 8-ft. sections of ⅝- x 5-in. Ty-Rod wire cloth. Thus, a uniform sized material not to exceed ⅝-in. top size is made available for grinding—part of the program to step up raw mill production from the original milling equipment. Formerly, as has been pointed out, secondary reduction was through a small hammer mill operated in open circuit, and obtaining an oversize feed.

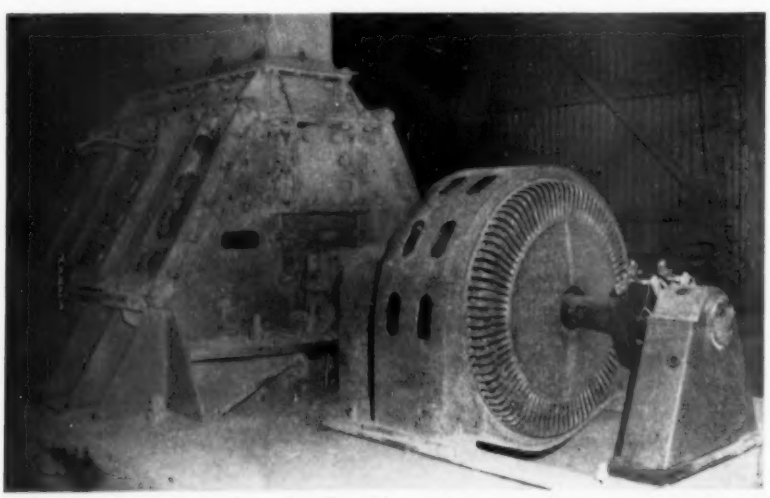
The crushing plant has two continuous discharge, bag-type dust collectors. A No. 17 Sly type 360 unit serves the hammer mill feed and discharge, returning the dust on to belt conveyor No. 2. The screens are ventilated by a No. 45 collector of the same type and the dust is discharged on the belt conveyor transporting the stone on to storage.

Two enclosed 30-in. belt conveyors in tandem deliver the stone overhead to the storage silos. The first (No. 3) is on 575-ft. centers, and conveyor No. 4 is on 384-ft. centers. At the transfer, provision has been made for sampling, with a Sturtevant automatic crusher and Vesin sampler installed for the purpose.

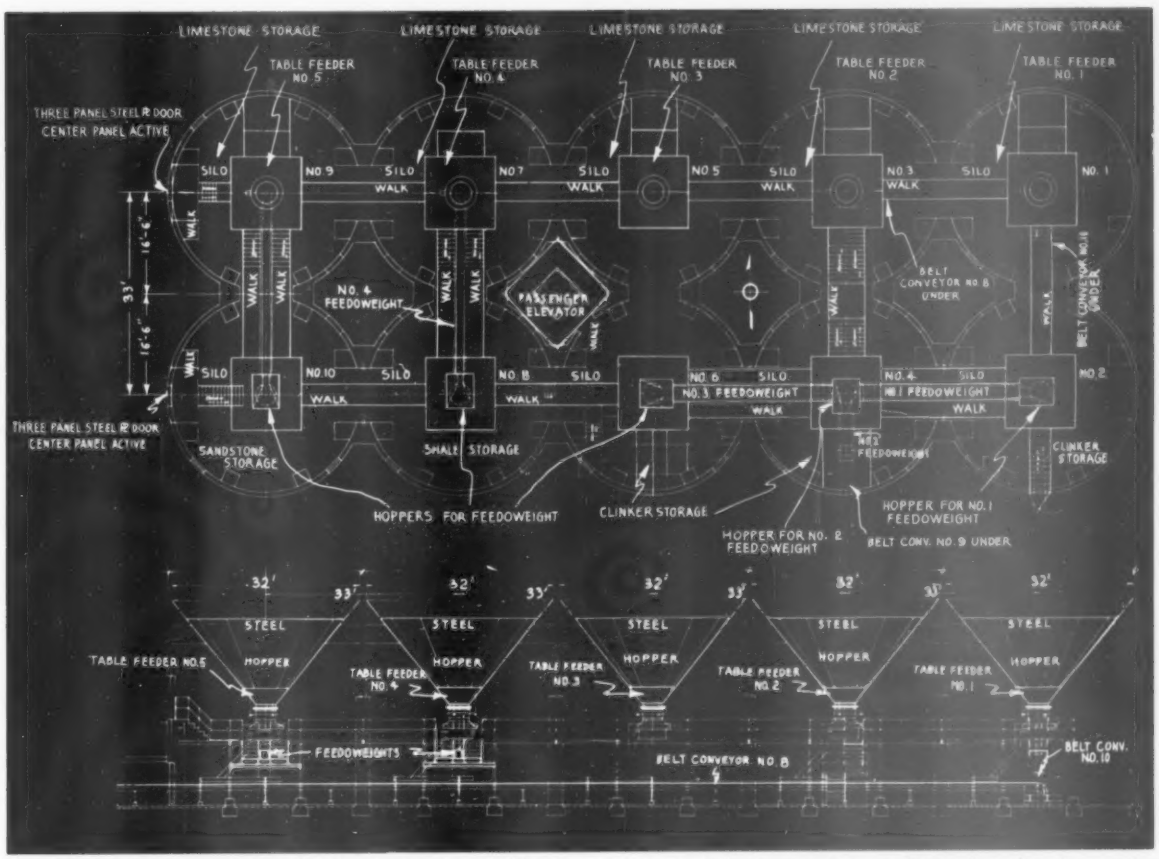
Silos are of reinforced concrete construction arranged in two rows of five, each measuring 32 ft. in diameter by 90 ft. The five comprising stone storage are in one row. They have a capacity of 2850 tons each with provision to draw from one silo at a time or from the five silos simultaneously, thus providing flexibility for blending purposes. One of the limestone silos, however, furnishes the masonry cement plant and is generally reserved for this purpose.

Two silos at the far end of the second row are for shale and for sandstone, the other three being for clinker. Each of the three clinker silos has a capacity of 12,600 bbl.

Overhead, belt conveyor No. 4 transfers limestone, shale and sandstone separately on to a 30-in. hori-



Secondary crusher is designed to reduce 7- to 8-in. top size stone to ⅝-in. minus size at the rate of 300 t.p.h., operating in closed circuit with two vibrating screens in parallel. It is driven by a 450-hp. motor at 900 r.p.m.



Plan and elevation of new storage silos. Limestone silos permit blending to a common belt conveyor. Separate feeders (not shown) proportion gypsum into clinker stream for feed to grinding mills

zontal belt conveyor, 141-ft. centers, which has an automatic tripper with 2-way chute. On one side of the belt, the discharge is into the selected limestone silo; on the other side, to either of two 30-in. belt conveyors, 31-ft. centers, for delivery of shale and sandstone into their respective silos. Limestone silo No. 1 (high calcium) is filled direct. Conveyors Nos. 1 and 2 have a capacity of 600 t.p.h. (350 f.p.m.), and conveyors Nos. 3, 4 and 5, delivering into storage are designed for 350 t.p.h. capacity (325 f.p.m.).

Raw Grinding

Feed for raw mill grinding is generally drawn from three limestone silos simultaneously, at controlled rates, to accomplish blending on to a common 30-in. belt conveyor, 201-ft. centers, below. Rate of feed from each silo is controlled by a 72-in. Allis-Chalmers table feeder driven through Falk gear reducer by a 5-hp. motor. Setting of the scraper blade is the means of adjusting rate of feed.

Shale and sandstone feed are proportioned from their respective silos by individual 16-in. Merrick Feedoweights which deliver to transverse belt conveyors, discharging to the common conveyor beneath the limestone silos.

The reclaiming 275-t.p.h. belt conveyor transfers proportioned raw materials to a 56-ft. centers belt conveyor for delivery into the mill room and elevation overhead for distribution by belt conveyor into the mill feed bins. These bins originally received roughly proportioned raw materials direct from the old stone crushing plant.

Through providing a uniform size of feed not to exceed ⅝ in., changes in construction of the mills and cutting the maximum ball size, output of each mill was increased about 12½

Each of the stone storage silos has table feeder with adjustable scraper blade for withdrawal of stone at controlled rates for blending to common belt conveyor below

The plant has six slurry storage tanks, a large blending basin and four kiln feed tanks for slurry

percent in grinding a 35 percent moisture slurry to a fineness of 88 percent passing a 200-mesh sieve.

Originally there were three two-compartment raw grinding mills. Two were 8- x 30-ft. units and the third measured 8- x 9- x 39-ft. with a 9-ft. diameter preliminary compartment. The latter mill was converted to 8 x 32 ft. and the scoops for transfer of materials between compartments in all three mills were replaced by grates for quicker flow through. The smaller mills are driven through magnetic clutches by 800-hp. synchronous motor, and the large mill is connected to a 1100-hp. synchronous motor.

Preliminary compartments are 10 ft. in length. Maximum ball size carried is 3 in., whereas 3½ and 4-in. sizes were required before to grind the large sized materials as fed into the mills. Use of smaller ball sizes was also desired, to cut the wear on liners. Production is approximately 90 bbl. per hour for each mill.

Slurry

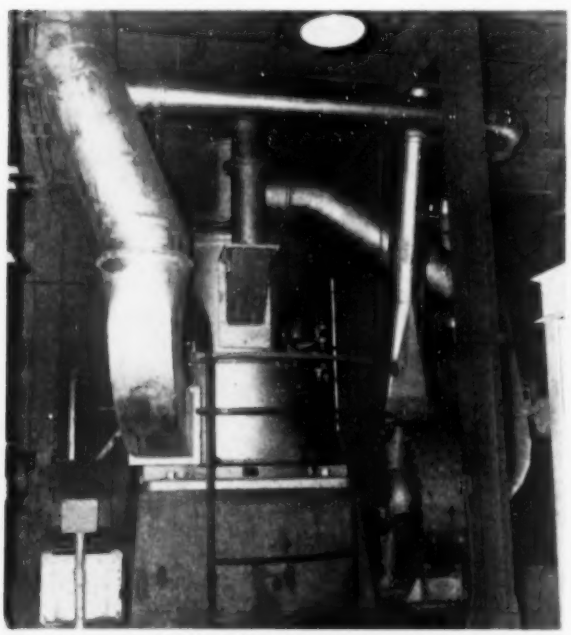
There has been no change in the slurry storage and blending. A single slurry pump is fed the discharge from the three raw mills, delivering into six grinding tanks of 700-bbl. capacity each. Slurry is drawn from various combinations of these tanks, in controlled amounts, and pumped into an 1800-bbl. capacity blending basin which has both mechanical and air agitation.

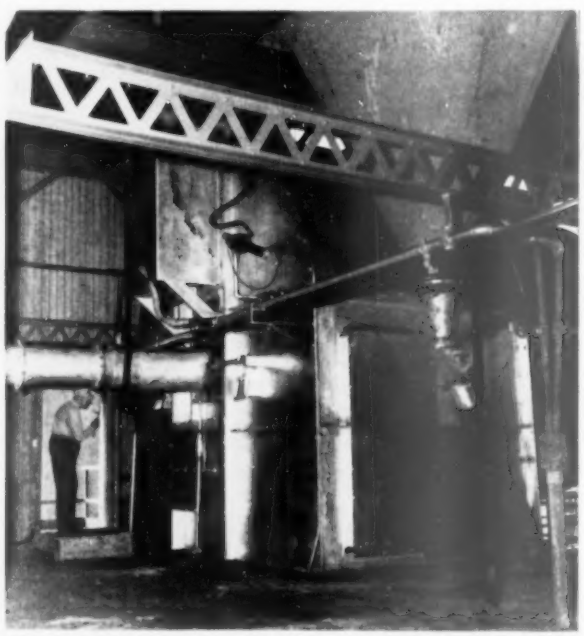
Four kiln feed tanks have a capacity of 4000 bbl. each and are arranged so that, if one fills up, it will overflow into another. All tanks are agitated through an automatic system of air supply.

The original ferris-wheel type slurry feeders for the kilns were retained but re-located when the dust chambers for the kilns were rebuilt. These feeders are now actuated by a Louis-Allis variable speed motor with a Dynamatic control synchronized with the kiln. A single overflow tank serves both kiln feeders and the excess is returned into the kiln feed tanks. A new concrete stack was erected when the changes were made to the building and auxiliary equipment at the feed end of the kilns.

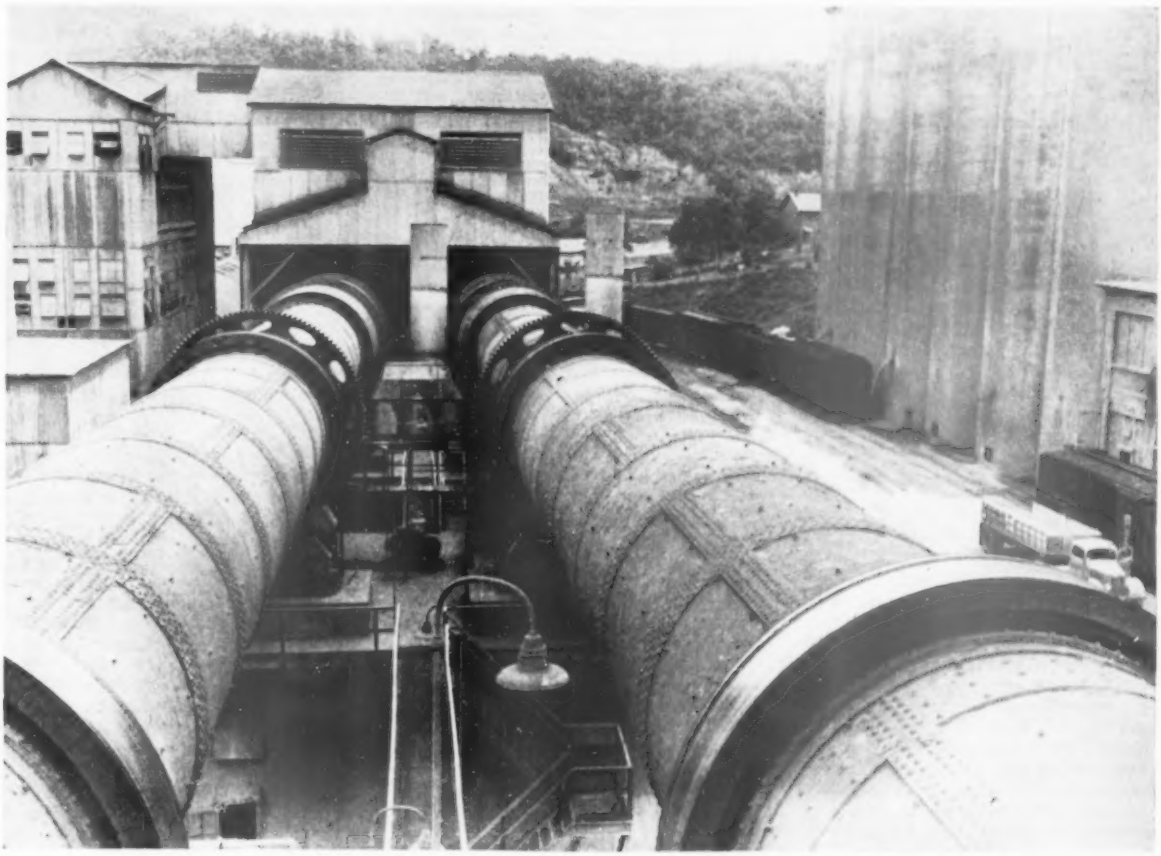
Kilns

One of the last steps in the overall program was to rebuild the kilns with removal of approximately 60-ft. sections from each kiln where the steel shells had been warped or burned and with replacement of hoods designed for the control of air admittance. In this stage of the reconstruction program, uniformity in design of both kilns was achieved through the adoption of 15-ft. diameter calcining zones for each unit whereas only one of the kilns had formerly been provided with the large diameter section. There had been a slight difference in length of the kilns previously which now have a uniform length of 250 ft. They are 11-ft. 6-in. in diameter excepting for the 15-ft. diameter calcining zones which are located 27-ft. 5-in. from the





Left: Kilns are fired by individual, direct-firing coal mills. Temperature of coal-primary air mixture is maintained at 180 deg. F. Right: In rebuilding the kilns, stationary hoods have replaced the original movable type. Firing is with pulverized coal through a water-cooled burner pipe with tip 18 in. outside the end of the kiln shell



Two 250-ft. kilns looking toward firing ends. Short stacks are for clinker coolers. Finished cement silos are on right

firing end of the kiln and extend 56-ft. 1½-in. back, which dimension includes the conical end sections. At the same time Raymond coal pulverizers and Narsted coolers were installed.

Production from the kiln with enlarged diameter calcining zone was approximately 200 bbl. of clinker more per day than the output from the straight 11-ft. 6-in. diameter kiln. The heavier bed carried in the enlarged diameter zone, with longer retention time, apparently contributes to increased production because the material is in such condition that it can be brought into that zone at an increased rate.

The old movable kiln hoods were replaced by stationary hoods, and snug seal rings and B & W nose rings were installed, as part of the changeover for controlled firing. Firing is now done with a very short hot zone from a water-cooled burner pipe with its tip some 18 in. outside the end of the kiln shell. The burner tip extended 18 in. inside the shell before the firing ends were rebuilt.

A 175-ft. reinforced concrete stack was built by Rust Engineering Co., to serve both kilns from a common breeching, the dust chambers were rebuilt and automatic draft control was installed to be operated from the burning floor. The kilns were relined with 6-in. brick, using basic brick in the hot zones and alumina brick for the balance of the kiln lengths. Chain sections consisting of loops of ⅝-in. distorted chains (F.L.S.) were installed extending for a length of 62 ft., starting a few feet from the feed ends.

New direct-firing coal mills were installed and the new clinker coolers are air-quenching type from which preheated secondary combustion air is supplied. Coal as delivered to the mill is put through a 24- x 24-in. single-roll crusher for reduction to 1-in. top size, then elevated into the coal mill feed bins.

The coal mills are No. 533 Raymond bowl mills with independent roll-type feeders, rated to pulverize 13,000-13,750 lb. per hr. to a fineness of 80-85 percent minus the 200-mesh sieve,

General view in mill room. There are three raw compartment mills for wet grinding in open circuit. Two 2-compartment mills do the finish grinding of cement in open circuit. They are preceded by two preliminary grinding mills

when grinding coal of grindability factor 55 and containing up to 20 percent moisture. Preheated air for drying the coal is drawn from the kiln hoods in the conventional way. Clinker dust is trapped in an 8-ft. diameter cyclone, the dust returned into the clinker cooler conveyor, and the cleaned air put through the mill. Air entering the mill is held at about 600 deg. F. to maintain the temperature of the primary coal-air mixture at 180 deg. F. Design is for delivery of 550 lb. per minute of primary air into the kiln. The burner pipe in each case is 17-in. diameter, 32 ft. long and the tip is 15-in. diameter. Drives for the coal mills are 200-hp. motors.

Instrumentation for each bowl mill includes a 2-pen thermometer, with recording controller for automatic tempering of the hot air entering the mill, the damper on the 30-in. duct being actuated by air motor.

Clinker Coolers

Space beneath the kilns was limited in available headroom, which led to the selection of Fuller-Narsted horizontal air-quenching clinker coolers to replace the rotary coolers. These coolers are one of the first commercial installations of this make to be made in a cement plant in this country, although they have been used for a number of years in plants of the Canada Cement Co. where they were developed.

At West Winfield, the coolers consist of 5- x 60-ft. horizontal stationary cooler grates, and spreading cooler chain conveyors which are equipped with automatic speed control, there being hydraulic drives for the motion of spreading and for the pusher mechanism which moves the clinker.

These clinker coolers are designed to cool the clinker by air supplied under pressure beneath the moving clinker bed. There are divided air chambers. One is for the hot end through which cooling air is preheated to enter the kiln hood as secondary air for combustion; the other is for the lower end through which excess air at low temperature is exhausted.

These particular coolers have 54-ft. 8-in. drag chain conveyors and were designed to cool the clinker from 2500 deg. F. down to 150 deg. F. at a maximum rate of 2500 bbl. per day, assuming clinker of 1-in. top size and cooling air to be available at 70 deg. F. Cooling air is supplied each unit by a New York Blower Corp. fan driven through V-belt by a 75-hp. motor. Rating is 54,000 c.f.m. at 7-in. static pressure.

Excess air through the lower chamber of each cooler is exhausted through a Buell cyclone dust collector. These collectors have non-return valves, and vent cleaned air through 35-ft. stub stacks at 180 deg. F. The fans are driven by 50-hp. motors through V-belt and are rated at 50,600 c.f.m., at 200 deg. F.

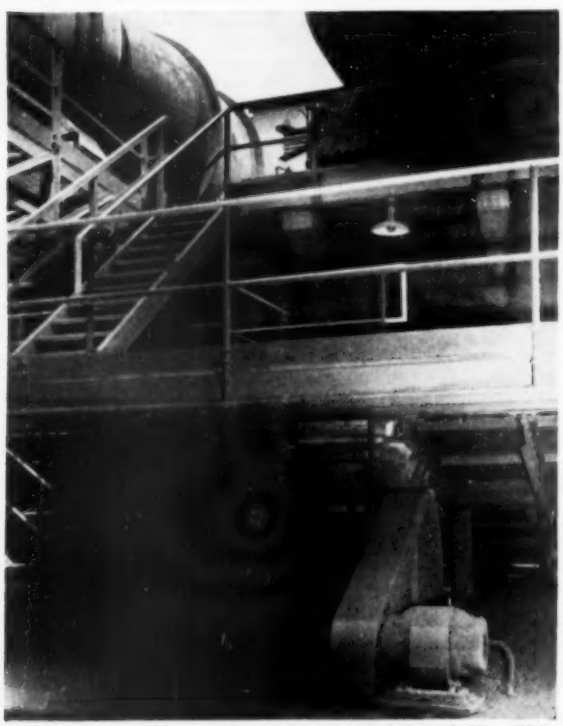
Operation of the coolers may be by manual control, or through automatic speed control of the cooler chain conveyor, to maintain a constant temperature of the preheated secondary air. Power is transmitted through hydraulic oil under pressure, to regulate the chain conveyor speed.

Approximately 13,600 c.f.m. of preheated secondary air enters each kiln at 1240 deg. F. which was calculated to reduce the fuel consumption by 120,000 B.t.u. through heat recuperation from that source alone. This represents a saving of 10 lb. per barrel, of 12,000 B.t.u. per lb. of coal. Fuel requirement is now from 1,200,000 to 1,300,000 B.t.u. per bbl. or from 100 to 109 lb. of coal. Clinker from each cooler is crushed through a 10- x 20-in. Traylor TY "N" jaw crusher driven through V-belt by 20-hp. motor.

Firing-Controls

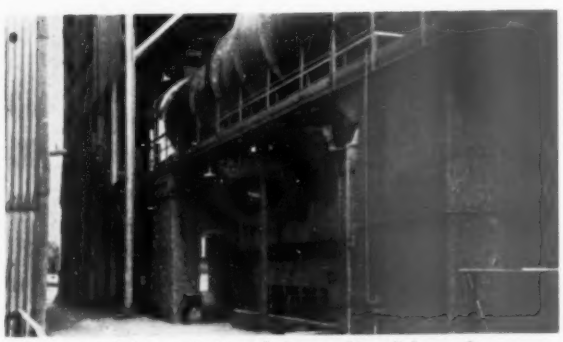
Centralized control panels with necessary instruments for firing were installed for each kiln. Among instruments provided were a Hays indicator for the coal mill suction and fan pressure; a Brown indicating instrument for temperature of the exit gases at the dust chamber; manual and automatic kiln speed control; hood draft; dust chamber draft; pressure in both clinker cooler chambers; slurry feeder counter; kiln revolutions; coal feeder revolution counter; ammeters for the draft fan, kiln drive motor, coal feeder; and switches for the various firing equipment.

A Brown potentiometer records the kiln speed and the hot zone temperature as measured by rayotube; the

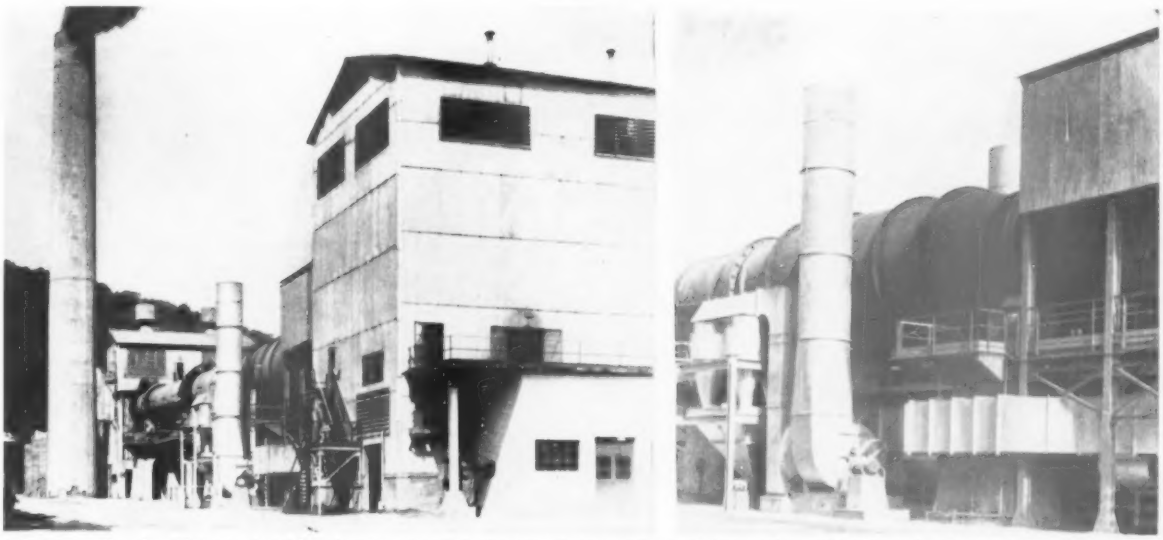


Clinker from each air-quenching cooler is crushed through 10- x 20-in. jaw crusher, the product from both crushers being transferred by shaking conveyor to bucket elevator

Hydraulic drive mechanism alongside air-quenching clinker coolers



One of the two horizontal air-quenching clinker coolers



Left: View taken from firing end of kilns showing one of the horizontal air-quenching clinker coolers with its cyclone-type dust collectors and exhaust stack. Large exhaust stack handles exit gases from both kilns. Right: Close-up of horizontal air-quenching clinker cooler. Excess air through the lower chamber of cooler is exhausted through a cyclone dust collector which vents to a stack. Note enlarged diameter calcining zones

temperature of the air entering and leaving the coal mill, and the temperature of the air in the cooler throat are also recorded. A thermocouple in the induced draft housing and one also in the exit gas stream are wired to a siren which sounds if the exit gas temperature exceeds the set safe maximum temperature of 750 deg. F. A damper in the dust chamber housing is opened or closed by air cylinder as required, from the burner floor.

The kilns may be turned at five different speeds but are being held at 60 r.p.h. Practice is to maintain a constant firing rate and to make adjustments in kiln speed as needed to compensate for variables, rather than the reverse practice which seems to be more common in the industry.

Back end draft is held to maintain a slight (.05 in.) negative pressure at the kiln hood, just sufficient to prevent puffing. Clinker is burned with 8 to 10 percent excess air, which is equivalent to 1.2-2 percent O_2. The coal mill operation is entirely automatic.

Finish Mill

Clinker storage in the old concrete silos (2) was 16,000 bbl. These silos have been retained but for the storage of cement, to be drawn into the separate mill building for the manufacture of high early strength cement and mortar cement.

Clinker discharged from the coolers (crushed) is conveyed by skipulter for transfer directly into a bucket elevator or by way of a spout and 18-in. pan conveyor to a second bucket elevator to be elevated overhead into storage. Storage is in three of the new silos which are filled from the elevators by drag conveyor.

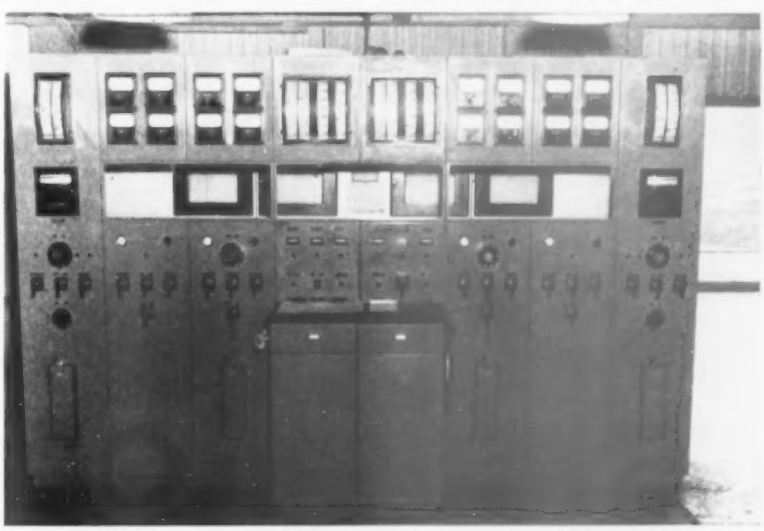
Under each of the three silos are 24-in. Merrick Feedoweights to proportion the clinker for transfer by 24-in. belt conveyor to a bucket elevator serving two overhead mill feed bins. Gypsum, as received by rail and discharged into a track hopper, is fed by 18-in. vibrating conveyor to a bucket elevator filling two overhead gypsum bins. Jeffrey-Traylor constant weight Waytrols proportion the gypsum on to a belt which discharges into the bucket elevator carrying clinker to the overhead mill bins.

Finish mill capacity was limited in the old plant. Two 3-compartment mills were fed clinker (and gypsum) which had first been reduced to ½-in. top size through a roll crusher. Their capacity was 80 bbl. per hr. each of which required that they be operated a minimum of 16 hr. per day.

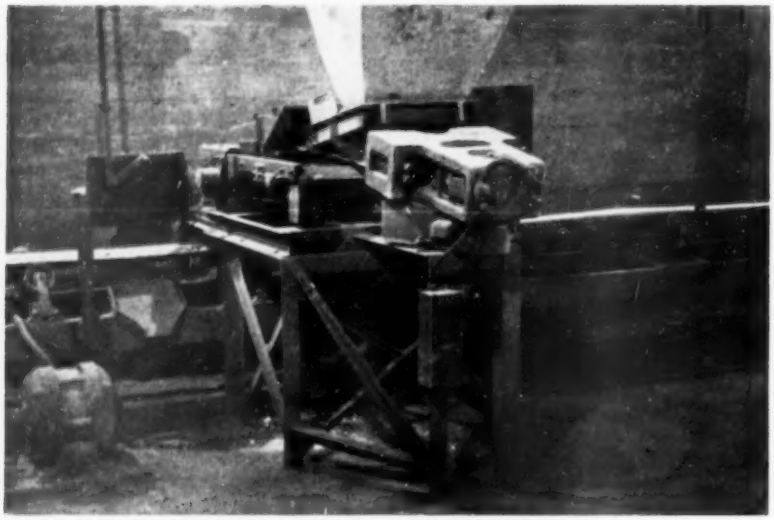
These mills were converted to 2-compartments for finish grinding in open circuit, and two Bradley Hercules mills were put in for preliminary grinding. The compartment mills have a 20-ft. long first compartment and 10 ft. for finishing. They carry mixed charges of grinding balls consisting of 1-in. minus balls in the first compartment and ⅝-in. minus in the second. When operated in single circuit, 3, 2 and 1-in. balls were required in the three separate compartments.

The Bradley mills carry 7-mesh, .012 wire and are each producing 150 bbl. per hour of finish mill feed. Finished cement is produced at the rate of 150 bbl. per hour for each mill, ground to a surface area of 1800-1850 (Wagner).

High early strength cement and mortar cement are manufactured in a separate mill building adjoining the



Kilns have centralized control panels on the burning floor for all firing operations



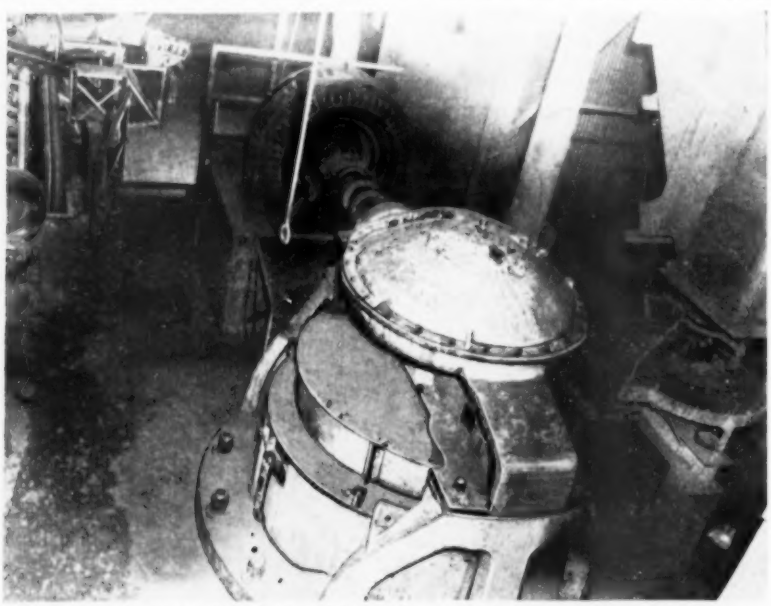
Weighing feeder proportions flow of gypsum for finish mill grinding

two silos from which high gypsum, high lime cement are drawn. These silos are filled by F-K pump direct from the grinding mills.

High Early-Mortar Cement

In the manufacture of mortar cement, high lime stone is withdrawn from its silo by table feeder direct to a 24-in. reclaiming belt conveyor which delivers the stone into the mill room. It is elevated overhead to a feed bin from which it is fed to a No. 6058 Raymond high-side roller mill which is swept with heated air from an oil-fired furnace. The limestone is pulverized to 94 percent minus the 200-mesh sieve, discharging from an overhead 9-ft. diameter cyclone into a 10-ft. diameter, cone-bottomed storage bin of 350 bbl. capacity. From this bin a screw conveyor feeds the pulverized limestone into one side of a Butler automatic weighing scale.

Cement is drawn from either silo by 6-in. F-H Airslides for transfer overhead by bucket elevator to a 350-bbl. bin on the opposite side of the automatic weighing scale. The Airslides are open-top inside the silos. The automatic weighing system is interlocked to hold the correct proportion of limestone and cement, which discharges into a hopper below and is fed into a 6- x 22-ft. tube mill through a double discharge feeder. The tube mill is driven by a 300-hp. motor and is in open circuit. Finished product is pumped to mortar silos at the rate of 75 bbl. per hr. by a new 5-in. type L, F-K pump. In producing high early strength portland cement, preground cement from the silos is reground in the 6- x 22-ft. tube mill in closed circuit with a 16-ft. Sturtevant mechanical air separator. Rejects from the air separator are returned by air slide into the tube mill feed spout. A separate F-K pump handles the product through independent connections feeding to the cement silos. The system is vented by a 17-ft. Sly (5000 c.f.m.) automatic bag-type dust collector which returns the cement into the circuit.



One of two preliminary mills in finish end, installed in conversion from single-stage to two-stage grinding of cement

Cement Cooler

Total storage of cement in silos and interstices is 357,000 bbl. Cement is pumped into storage from the grinding mills by a 7-in. F-K pump through an 8-in. line. By way of a 2-way valve, type C tested, air-entraining cement for the Pennsylvania Highway Department, which must not exceed a temperature of 150 deg. F. at the time of delivery, is diverted to a cement cooler which is a carry-over from the old plant.

This cooler was made from a rotary dryer and is 9 x 60 ft. with a pitch of ½ in. and is driven at 30 r.p.m. by a 75-hp. motor. It has 2-in. extra heavy pipe all around its inner circumference for cool water circulation and 18-in. baffles at both ends to maintain a 30-in. bed of cement in the cooler. Water from an adjacent creek is pumped through the pipe at the rate of 100 g.p.m.

A 4000-bbl. concrete silo was built to receive the cement to be put through the cooler. Cement is drawn from the silo by airslide to an elevator, put over a Hum-mer screen to remove tramp iron or other extraneous material, and is fed through a spout into the cooler. Discharge of cooled cement is into the hopper of a 7-in. F-K pump for delivery into tested silos. The cooler is effective in reducing the temperature of cement from 250 deg. F. to 140 deg. F. at the rate of 300 bbl. per hr. A thermocouple in the pump feed hopper records the temperature as a check on performance.

Equipment

Much of the equipment including gear reducers, conveyors, belting and elevators was standardized to simplify maintenance and inventory.

All of the belt conveyors for handling raw materials in the crushing and screening plant, into storage, and throughout all the plant re-building program are of standard type as to manufacture.

Troughing, return and self-aligning idlers, and also the tripper are of Jeffrey manufacture. Belting was supplied by Goodyear. The drives are Morse roller chain and sprocket with De Laval Steam Turbine Co. gear reducers. Morse steel couplings were used extensively. Inclined belt con-

Left: View of new air-conditioned modern office. Right: New air-conditioned laboratory

veyors are equipped with Link-Belt backstops, and some of the conveyor idlers are Link-Belt.

The majority of electric motors are of Allis-Chalmers and Louis-Allis manufacture. Substations with transformers, switchgear cabinets, motor controls, and lighting panels with separate lighting transformers were installed in the several mill departments. Keasby-Mattison and Johns-Manville supplied roofing and siding material for the buildings. Kensington Steel Co., and Jeffrey Mfg. Co. supplied elevator sprockets, buckets, etc., and Bethlehem Foundry and Machine Co., the elevator casings and shafts.

It is of interest that Adjusto-Spede drives were provided for all the feeders requiring readily adjustable speed control. This is a drive that is relatively new to the industry. Power is transmitted from the motor, in this drive, with the Dynamatic eddy-current principle which was first used by Penn-Dixie for kiln drives in its Kingsport, Tenn. plant (see ROCK PRODUCTS, January, 1952, pp. 140-147).

With this type of drive, a slip is required between the input and output member to develop torque, and the torque capacity varies with the difference in speed between the input and output shafts. The input member is driven at constant speed and there is no mechanical connection to the driven member (individual shafts), the transfer of power being accomplished by magnetic attraction between the two. A field coil on the load side is energized by d-c current and the slip is adjusted to meet the load requirements.

This is a means of obtaining adjustable speed from a constant speed motor with full-start torques and with speed control over a wide range. In the Adjusto-Spede, for use where low power is required, the coupling and motor are combined into a single unit.

Credits-Personnel

Penn-Dixie's engineering staff did the design for much of the entire program. W. R. Bendy was designing and consulting engineer for the bulk loading plant.

Trimble Construction Co., Pittsburgh, Penn., was general contractor for much of the construction, including the raw storage and clinker silos, conveyor work, primary crusher building, wash rooms, shops, garage and the new office and laboratory building which was constructed of Cemenstone precast concrete structural units.

Rust Engineering Co. built the concrete stack and did the work in modernizing the kiln feed end of the plant and built the new cement cooler building, also certain other structural steel work.

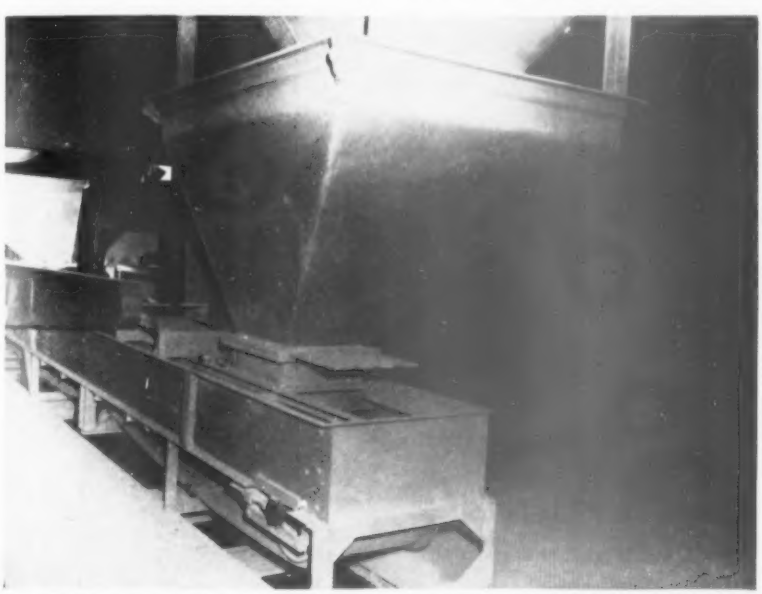
Allis-Chalmers rebuilt the kiln ends and the American Bridge Co. erected the sections.

J. C. McGrath is plant superintendent; J. G. Phillips, plant engineer; E. B. Guth, chief chemist; Wm. J. Shafer, mine superintendent; and Ray Harbison is trucking foreman.

E. P. Newhard is vice-president and operating manager with offices at Nazareth, Penn.; and L. Silcox is assistant operating manager with headquarters at Chattanooga, Tenn. F. H. Compton is chief engineer; R. P. Scott, operating assistant; J. Sorteberg, electrical engineer; and W. P. Gano, chemical engineer, all with offices at Nazareth.

Victor N. Roadstrum is chairman of the board of directors; B. W. Druckenmiller is president; George Kilian, secretary-treasurer; and Fred L. Doolittle, vice-president and general sales manager with offices in New York City.

Penn-Dixie Cement Corporation has an annual capacity of ten million barrels of cement. Mills are located at Kingsport, Tenn.; Richard City, Tenn.; Clinchfield, Ga.; Nazareth, Penn.; Penn-Allen, Penn.; Bath, Penn.; West Winfield, Penn.; and West Des Moines, Iowa.



One of feeders to proportion clinker to belt conveyor reclaiming clinker to finish mill department

POZZOLAN CEMENTS

Gaining Favor In Mexico

New specification has been developed for portland-pozzolan cements. Mexican cements have conformed to the best standards in the United States

By FEDERICO BARONA DE LA O*

Looking down San Juan de Letran avenue in modern Mexico City. Concrete pavements were constructed 20 years ago over a poor soil foundation

MEXICO, with 27 million people, is growing at the rate of 800,000 per year. Engineering, labor, equipment, steel, aggregates, cement, etc., work together to produce each year, 700 million dollars worth of construction, public and private. About 5 percent of the total, 300 million pesos, represents cement.

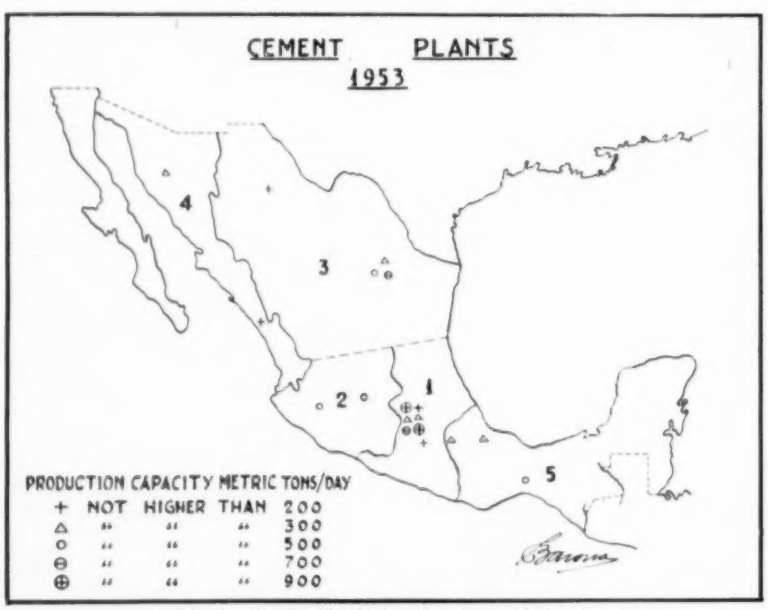
The cement industry plays an important role in construction activities; it should be active in research and education to improve cement and concrete technology, promote and extend the uses of cement.

Production Tonnage

The map and Table I show location of the 18 Mexican cement plants, their capacity in tons per day, and the approximate location of the zones they supply. The annual production corresponds in general to 300 effective working days.

Mexico's cement production has risen steadily from 1933, when 1,500,000 bbl. were produced, to 1953, when the 12,000,000 bbl. mark will be reached; that is an eightfold increase in 20 years.

Mexican engineers have developed new trends in some phases of cement and concrete technology, but the usual concrete designs and specifications in the United States—the American Concrete Institute, American Society of Civil Engineers and A.S.T.M.—are generally adhered to in Mexico. The Mexican Official Specifications for structural, and for reinforcing steel, and for cements, require strengths and quality equivalent to A.S.T.M.



Map of Mexico showing distribution of cement producing capacity

Portland Cement Specifications

The Mexican Official Specification DGN Cl 1953 for portland cement includes the same types and presents practically the same requirements as A.S.T.M. C 150.

The five portland cement types adopted by A.S.T.M. in 1940 cover well the special requirements found in construction. In some instances portland-pozzolan, or basic granulated, blast-furnace slag-portland blends, can be substituted for some of the portland types.

In most cases the straight portland type, adequately selected, will prove more uniform. The portland types and their alternatives are indicated in Table II, page 127.

Portland-Pozzolan Specifications

Entire zones of Mexico depend solely on portland-pozzolan cement for all concrete work: buildings, pavements, canals, dams, spillways, etc.

Out of 12,000,000 bbl. annual cement production in Mexico, 1,750,000 (15 percent) is of the portland-pozzolan type.

An up-to-date official standard specification was required to protect construction and users in about six states of the Mexican Republic. The new specification was discussed and approved the second week of April this year, at a meeting of producers and

*Chief, Technical Materials and Secretary of Recursos Hidraulicos

TABLE I: Production of Cement in Mexico, 1953.

Zone		1	2	3	4	5	Sum
		Central Metropolitan	Central West (Bajio)	North-East	North-West	South-East	
Number of States:		5 (Federal District included)	5	7	4	10	31
Inhabitants (millions):		6.5	5	5.5	450	8	27
Number of cement plants:		7	2	4	2	3	18
Daily capacity	metric tons:	3000	800	1150	2	700	6100
	bbl:	17,580	4688	6739	2637	4102	35,746
Yearly production	metric tons:	900,000	240,000	345,000	135,000	210,000	1,830,000
	bbl:	5,274,000	1,406,400	2,021,700	791,100	1,230,600	10,723,800
Coefficient: yearly Kg/inhabitant:		138	48	63	68	26	68
Types of cement produced:		Portland: types I, II and III; White-Portland.	Portland: types II and III. Oil well cement, Portland-Pozzolan.	Portland types I and II; Blast furnace Slag—Portland. White-Portland.	Portland II. Portland Pozzolan.	Portland I, and Portland Pozzolan.	
Future additions:		5 Kilns (1350)	General improvements (200)	1 Kiln (450)	General improvements (50)	General improvements (200)	2250
Expected by the end of 1955:		4350	1000	1600	500	900	8350 (that is, 2,505,000 t/year)

users, under the chairmanship of the Mexican Bureau of Standards (Dirección General de Normas).

Principally, the new specification covers the following:

Designation—The name portland-pozzolan cement follows the usual practice to designate mix, by names of ingredients separated by a dash, as in asbestos-cement, sand-clay, silica-lime, etc.

Portland clinker content — should not be less than 70 percent.

Specific surface by Blaine—air permeability apparatus not less than 2900 cm^2/g.

Autoclave soundness test—expansion not higher than 1 percent; contraction not more than 0.3 percent.

No false set should be present.

Compressive strength to be equal to that required for portland cement type I, since in many places, portland-pozzolan is used for general purposes.

Minimum Values by Test
Similar to ASTM-C 109

	Kg/cm²	p.s.i.
At 3 days	60	853
At 7 days	120	1706
At 28 days	210	2986

Alkalis ($Na_2O + 0.658\ K_2O$): Not more than 1.2 percent; but when *special low alkali cement* is required by purchaser, alkalis should not exceed 0.60 percent.

Calcium sulfate content, as SO_3, determined by water extraction tests:

At 18 hours: not less than 0.2 g/liter.

At 24 hours: not to exceed 0.5 g/liter.

Important Structures Built With Portland-Pozzolan Cement

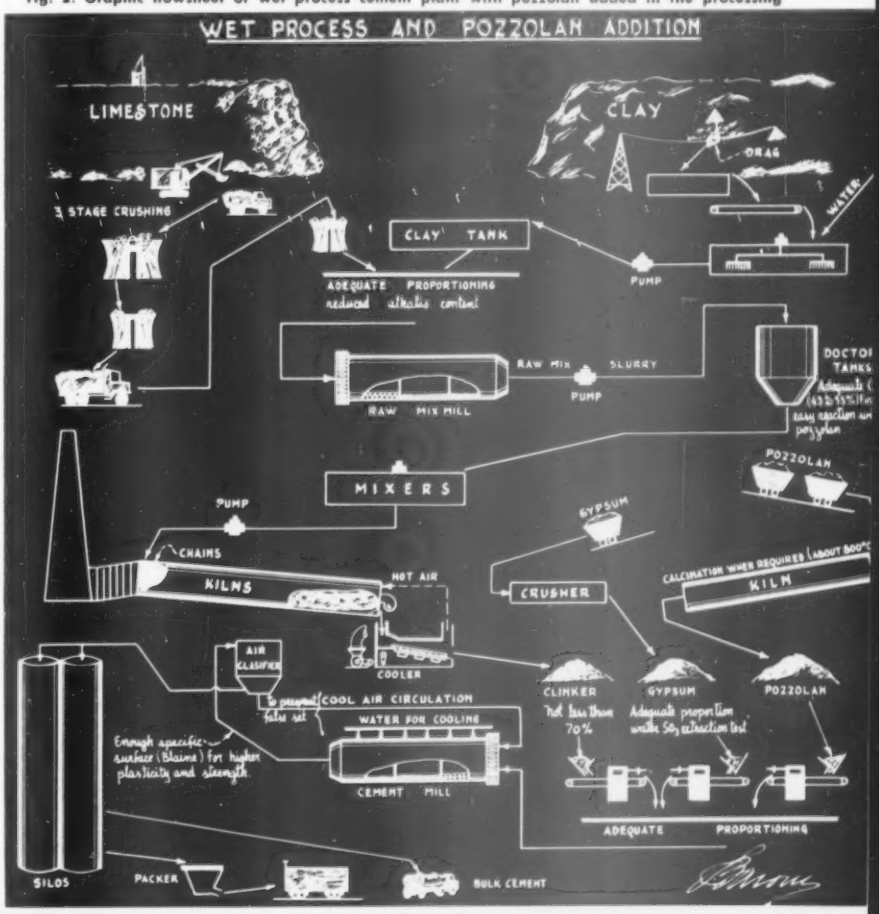
Mexican portland-pozzolan cement was used in the Colimilla thin arch dam, 33 ft. thick at base, 11.5 ft. at the crest and 280 ft. high; the 55,000 kw. power plant and the lining of its tunnels and surge pipe (47 ft. dia. by 169 ft. deep). The low heat of hydration of the portland-pozzolan cement reduced temperature stresses.

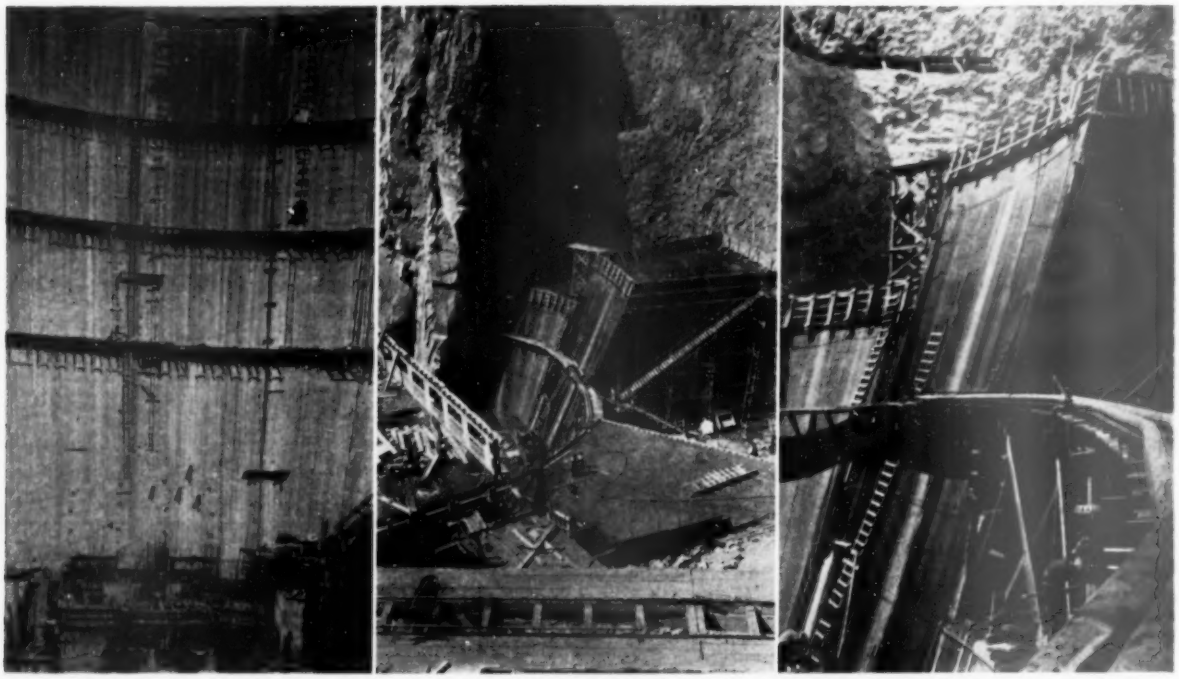
Morelos Dam on the Colorado River, under the terms of an International Water Agreement, was also built with cement of this type.

Cement for concrete structures on the Mexican side of Falcon International Dam on the Rio Grande, was obtained by intergrinding about equal parts of portland clinker, and basic granulated blast-furnace slag, with enough gypsum to satisfy the SO_3 water extraction test.

The spillway, tunnels and outlet works of one of the most important dams (Alvaro Obregón) recently built to irrigate half a million acres of land in the Yaqui Valley, about 350 miles south of the Arizona border, were built with portland-pozzolan ce-

Fig. 2: Graphic flowsheet of wet process cement plant with pozzolan added in the processing





Construction views of La Angostura Dam, Sonora, Mexico; a gravity-arch dam 300 ft. high in which low-heat, low-alkali portland cement was used

ment, which is also being used in the first concrete lining of a large canal (35 miles of a 3900 second-feet trapezoidal open duct) that Mexico has undertaken.

Specific Surface by Blaine Apparatus

Sieves to qualify cement fineness were abandoned 16 years ago, because the finest sieve (No. 325) has an opening 43 microns square, and cannot be used as a calibrating gage for grains four times smaller.

The Blaine air permeability apparatus (A.S.T.M. C 204), with proper corrections for density and porosity of the portland-pozzolan blends, is used at the United States Bureau of Standards to determine their specific surface; that is, the sum of the surfaces of the individual grains contained in one gram of cement. The Mexican specification requires portland-pozzolan cements to have not less than 2900 sq. cm. per gram. Such value represents a minimum requirement, since the three plants that produce those cements, present as averages: 3300, 3600 and 3900. The plant that produces portland-slag cement runs an average of 4000 sq. cm. per gram.

Hydration, setting and hardening of cement can progress only so far as the surface of its grains is in contact with water. To prevent wasted, unhydrated cores, cement grains should be quite small (about 10 microns average diameter).

High fineness, or high specific surface, which in the case of portland cement is important, is even more so in the case of pozzolans (silicious minerals that react with lime liberated in the hydration of cement) which are not as active as cement, and require a larger surface of contact. High fineness is desirable not only to increase hydration, hardening and strength, but also to provide better plasticity and workability to concrete mixes.

Fig. 1. shows graphically how important is the addition to cement of the proper amount of gypsum. The hydration of both calcium silicates provides the gel (silicate glue) that binds together sand and gravel, and gives hardness and strength to concrete. Calcium-aluminate hydrates quicker than silicates, and may involve them with a gel that hinders their proper hydration. Such a situation is shown at the top of the illu-

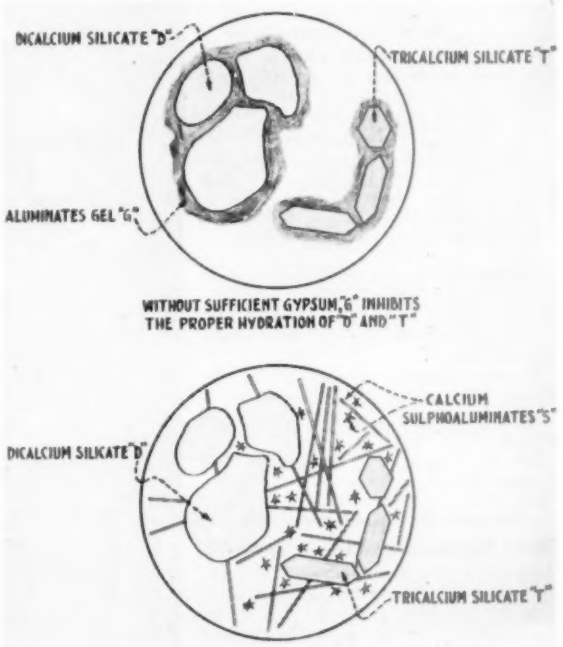

DICALCIUM SILICATE "D"
TRICALCIUM SILICATE "T"
ALUMINATES GEL "G"
WITHOUT SUFFICIENT GYPSUM, "G" INHIBITS THE PROPER HYDRATION OF "D" AND "T"
CALCIUM SULPHOALUMINATES "S"
DICALCIUM SILICATE "D"
TRICALCIUM SILICATE "T"

Fig. 1: An adequate amount of gypsum prevents the formation of "G," promotes crystal needles "S," and allows the proper hydration of "S." Excess gypsum will promote further growth of "S," resulting in adverse effects on hardened cement

TABLE II Portland Type	Substitute Blends
I—Commercial, or General use: for concretes and manufactured products, with no special requirements, or conditions.	High efficiency Portland-Pozzolan, (about 20% Pozzolan), or Portland-Slag (about 50% slag).
II—Modified: when Moderate Heat of Hydration is required, or where mild sulfate attack is expected.	Similar blends as in case I, but Tricalcium Aluminate in Portland-Clinker not exceeding 9%.
III—High-Early Strength: when concrete is expected to acquire certain strength, in about half the time as with type I.	No substitute
IV—Low-heat: where massive sections require lower and slower development of hydration heat.	Similar blends as in case I, but with higher Pozzolan (about 30%), or slag (about 60%), and with Tricalcium Aluminate in clinker—not exceeding 8%.
V—Sulfate-resistant: where concrete will be in contact with high-sulfate soils or waters.	Similar blends as in case I, but Tricalcium Aluminate in Clinker—not exceeding 6%.

stration. If enough gypsum is added to combine with the calcium aluminate to form calcium sulphoaluminate, the alumina gel does not interfere with the silicates' hydration, as shown at the bottom.

Sufficient gypsum is required, but excess is to be avoided; otherwise, after cement has hardened, needles of calcium sulphoaluminate keep growing and disrupt concrete by expansion.

According to the Lerch investigations of the Portland Cement Association, each cement requires an optimum content of gypsum, as this results in higher strength and less drying shrinkage, which represents definite advantages to the user.

The Portland Cement Association investigation showed that clinkers low in C_3A and high in alkalis, require more SO_3 than those with high C_3A and low alkalis.

Forsen (Symposium Chemistry of Cements, 1938) states that in alkali-free cements, in contrast to alkali-containing cements, setting can be controlled by lime alone.

The amount of SO_3 required by different cements is influenced by their: (a) alkali content (b) C_3A content, and, (c) specific surface.

Since 1948, the Mexican Official Specification for portland cement, designation DGN-Cl, was changed, in regard to SO_3 stipulation, to fit the specific requirements of cement, as follows:

"0.8 percent, 8 percent, and 1800 cm^2/g (Wagner) are considered the minimum values of major influence, respectively, for: Sodium oxide content plus 0.658 times potassium-oxide content, tricalcium-aluminate content, and specific surface. Sulfurtrioxide content in any cement shall not be higher than 2.0 percent, 2.5 percent, 3.0 percent, and 3.5 percent, respectively, when it exceeds: none, one, two and three minimum values of major influence; nor lower than the corresponding values less 1 percent."

The result of applying the above clause to different portland cements is shown in Table III.

The SO_3 limitation as provided in the Mexican specification has been working satisfactorily with portland cements. The maximum values conceded generally agree with the *optimum* corresponding to higher strength, less drying shrinkage, and proper control of setting time.

The determination of the free gypsum content in hydrating cement, at the age of 18 and 24 hr. by extracting

Cooling cement mill with water to prevent dehydration of gypsum, false-set, and low efficiency in grinding

with water, was developed seven years ago by the Portland Cement Association, and lately (1951) adopted by the A.S.T.M. as a tentative testing method (C 265-51T). This test verifies that gypsum has been added in the amount required and not in excess; to be sure that it has been sufficient, a small trace should remain after 18 hours (that is after set has been completed). To check that it is not in excess, no significant amount should be found at the end of 24 hr.

A pat of cement mortar, 1:2.75, is broken in half; the first one is extracted by water at the age of 18 hr., and the second one at 24 hr. The limits, stipulated by the Mexican Portland-Pozzolan Specification are:

At 18 hours: not less than 0.2 g. of SO_3 per liter of water.

At 24 hours: not more than 0.5 g/liter.

A.S.T.M. has not stipulated a minimum limit for 18 hours, but has adopted, tentatively, the 0.5 g/liter maximum limit at 24 hr. (Tentative revision of A.S.T.M. C 150, and A.S.T.M. C 175-51T).

A practical performance test, like the SO_3 water extraction, is considered more reliable than the theoretical consideration of the factors of major influence (alkalis, tricalcium aluminate and fineness) as contained in the Mexican portland cement specification; but the extraction test should verify not only that no excess gypsum has been added (maximum limit at 24 hr.), but also that a sufficient amount is present; that is, a minimum limit should be stipulated at 18 hr., as the Mexican portland-pozzolan specification does.

It is expected soon in the Mexican portland cement specification to delete the SO_3 theoretical clause relative to SO_3, and establish the performance test (SO_3 water extraction), but stipulating both minimum and maximum limits at 18, and 24 hr., respectively.

False Set

Gypsum, composed of calcium-sulfate and two molecules of water, added to cement to control its set, when heated to 128 deg. C., loses $1\frac{1}{2}$ molecules of water, and becomes plaster of paris, which in contact with water, sets in a few minutes.

If such plaster of paris is enclosed within cement structures, its set stiffens the mass in only a few minutes after mixing.

False set (Blanks and Gilliland, A.C.I. March 1951) or premature stiffening of concrete mixes, due to de-

(Continued on page 192)

TABLE III

Cement Alternative	$Na_2O + 0.658K_2O$ more than 0.8% is marked "High"; less is marked "Low."	C_3A more than 8% is marked "High," less is marked "Low."	Specific Surface (Wagner) more than 1800 cm^2/g is marked "High"; less is marked "Low."	Maximum allowable SO_3 according to: ASTM C-150-49.	Mexican Spec. DGN Cl-1948
1	Low	Low	Low	2.0%	2.0%
2	Low	High	Low	2.5	2.5
3	High	Low	Low	2.0	2.5
4	High	High	Low	2.5	3.0
5	Low	Low	High	2.5 (x)	2.5
6	Low	High	High	3.0 (x)	3.0
7	High	Low	High	2.5 (x)	3.0
8	High	High	High	3.0 (x)	3.5

(x) ASTM limit for type III which specific surface (about 2400 cm^2/g) is much higher than 1800 cm^2/g.

ROTARY KILN LOADING

Second article on a study of the passage of solid particles in rotary kilns

By IRVING WARNER*

THE BUREAU OF MINES Technical Paper No. 384, was issued in 1927, and entitled the "Passage of Solid Particles Through Rotary Cylindrical Kilns." This paper is long out of print. Also it was too technical for practical use. Herein I am endeavoring to brief this paper and reduce the findings to simple conclusions useful to the average operator.

In order that this article shall be complete in itself as a working brief of the paper, it will be necessary to repeat some of the matter that appeared in ROCK PRODUCTS, May, 1953, page 72.

Researchers of the Bureau of Mines discovered that the rate of travel of particles through a kiln varies directly with the slope and the diameter, and also with the square root of the angle of repose of the material being processed. Unfortunately they set forth a rather complicated formula based on the time to go through a kiln of a certain size and speed. This formula is:

$$t = \frac{1.77\ L\ \sqrt{\theta}}{pdn} \times \text{factor}$$

Wherein:

t = time to pass the kiln in minutes
L = Length of kiln in feet
θ = angle of repose of the material
p = slope or pitch in degrees
d = diameter of the kiln in feet
n = revolutions per minute

The "factor" is for contractions and equals 1 in plain cylindrical kilns. Hence it is ignored in this article.

This formula can be greatly simplified and made more usable in the following form:

$$L = \frac{pd}{1.77\ \sqrt{\theta}}$$

wherein L = distance traveled per kiln revolutions. As before, p = slope in degrees and d = diameter. L and d are in the same units such as feet or inches.

Most lime manufacturers use a sized stone for the feed which has a usual angle of repose of 36 deg. So, $\sqrt{\theta} = 6$. Those using oyster shells, a graded feed, or a material like that producing the granulated lime of New England, must make their own tests for angle of repose. This is readily done with a 2-ft. level on a natural pile of the feed material which is just about ready to slough but is in repose.

Fortunately, the angle of repose is a square root function so a small error in its determination is not important.

The feeds in some processes are wet, and the wet material has a steeper angle of repose. The paper shows that this does not affect the rate of flow. The material should be dried and then tested for its angle of repose, and this used in any calculations.

The formula can be further simplified by having the slope in inches per foot which is the common terminology of industry. With the angle of repose taken at the usual figure of 36 deg., we have the greatly simplified formula of:

$$L = .45\ pd$$

p is now inches per foot. This formula is for $\theta = 36$ deg. If the angle of repose, θ is other than 36 deg., then use the formula

$$L = .075\ pd\ \sqrt{\theta}$$

So if you have a kiln 8 ft. diameter at a slope of ½ in. per foot, the travel per revolution is:

$$L = .45 \times \tfrac{1}{2} \times 8 = 1.80 \text{ ft. per rev.}$$

The utilization of this information was explained at length in the previous article in the May issue.

We can now state important additional findings:

1. Rate of travel is not affected by size of the feed, provided it is a sized material of normal shape.

2. Rate of travel is not affected by the depth of the bed or load. The scope of the work included the range of very light to very heavy feed, and fully bracketed any normal practice.

3. Rate of travel per revolution of the kiln is not affected by the speed of the kiln. This statement would not apply to fast-turning machines such as tube mills wherein cascading takes place.

4. Length of kiln has no effect on rate of travel in the main body of the kiln.

5. A narrow dam in the body of the kiln which is less than the depth of the load has no effect on retarding

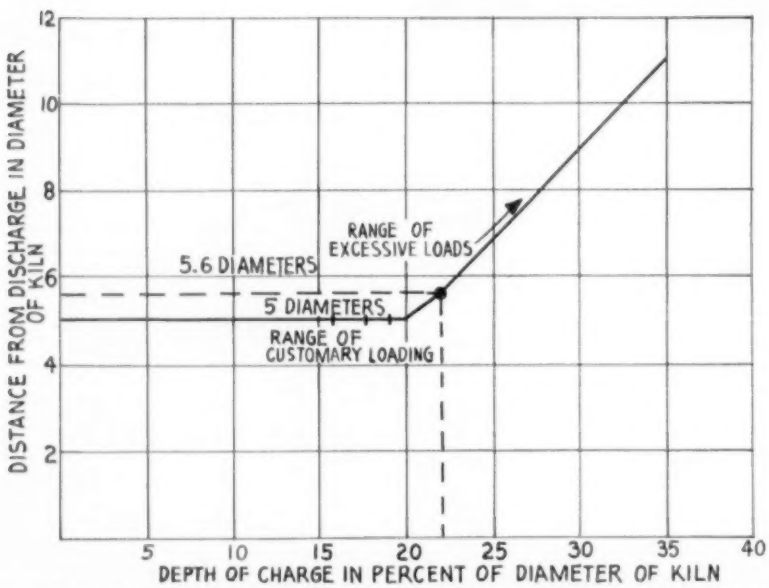


Chart 1: Showing effect of free end discharge. In the example, an 8-ft. diameter kiln is loaded to a depth of 21 in. which equals 22 percent of the diameter. The taper off of the load extends 5.6 diameters up the kiln or 5.6 x 8 ft. equals 44.8 ft. This is a very heavy load, and the curve apparently flattens below a load of 20 percent of the diameter. Hence for all normal kiln loadings, the effect of free discharge may be assumed to extend up the kiln for 5 diameters

*Vice-president, Warner Co., Philadelphia, Penn.

the flow. This is discussed further in this article.

Tapering Off of Depth of Load with Free Discharge

In the paper, this is referred to as the "dropping-off" effect. This can take place at the discharge end of a kiln, or when a kiln changes from a lesser to greater diameter. This phenomenon was explored for many different depths of bed. Chart 1, is drawn from their data on page 5 (table 3) of the paper. As to be expected, the heavier the normal depth, the further up the kiln does the dropping-off effect extend.

However, the heavy depths of bed are not used in practice. When the depth of a load is more than 17 percent of the kiln diameter, it can be considered heavy. Chart 1 shows that this dropping-off effect becomes constant for loadings of less than 20 percent of the diameter. The tests showing loadings in excess of 20 percent of the diameter have no value to the lime manufacturer and may be ignored. Therefore for all practical purposes we can consider that the dropping-off effect extends up the kiln for 5 diameters. This means that for a kiln 8 ft. in diameter, the dropping-off effect begins 40 ft. up the kiln.

From their tabulated data, it was possible to plot a profile of the dropping off for the various depths of load. This is shown in Chart 2. The great lengths of the dropping-off effect in the case of the heavy depths are to be noted, but it is reiterated that these great depths are not used in practice. The data on the curves having depths of 16 percent, 17 percent and 20 percent of the kiln diameter, are so nearly identical that one curve serves for the three loadings. The small differences in the data can be attributed to experimental error.

Chart 3, Curve 1, is plotted from the average data of 16 percent, 17 percent and 20 percent depths (based on kiln diameter).

Curve 2 shows the actual profile of the dropping-off effect of a free discharge of an 8-ft. kiln. The heights are given in inches. The full normal depth is 17 percent or 16.32 in.

These curves also show the theoretical effect of discharge dams of various heights. The profile is so steep near the discharge that a small dam has little effect on the discharge. However, if a dam is made, say 80 percent of the depth of the normal bed, it has the effect of increasing the length of the kiln by approximately 2 diameters.

For a specific example, assume a kiln is 8 ft. diameter and the normal loading is 17 percent=16.38 in. A dam 9 in. high is built at the discharge. This is 55 percent of the height of the normal load. As shown on Curve 2, the effect is to increase the length of the kiln by 6 ft.

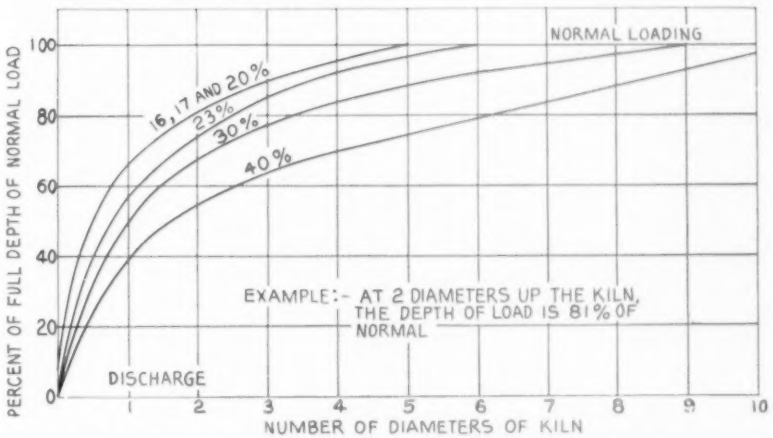

NORMAL LOADING
16, 17 AND 20%
23%
30%
40%
EXAMPLE:- AT 2 DIAMETERS UP THE KILN, THE DEPTH OF LOAD IS 81% OF NORMAL
DISCHARGE
PERCENT OF FULL DEPTH OF NORMAL LOAD
NUMBER OF DIAMETERS OF KILN

Chart 2: Indicates dropping off effect, free discharge for various loads, and depths in percent of diameter of kiln. Gives profiles of loading (Depth H) at discharge end of kiln with free discharge. Normal kiln loadings in practice are less than 20 percent of the kiln diameter. Curves of 16, 17, and 20 percent practically coincide. At 2 diameters up the kiln, the depth of load is 81 percent of normal

The volume in the dropping-off section for free discharge was calculated for a depth of bed that was 20 percent of the kiln diameter and extended 5 diameters up the kiln. This volume was found to be 74 percent of the normal bed. So the 26 percent loss of 5 diameters is 1.3 diameters or say 10.4 ft. loss of length in an 8-ft. kiln.

It must be noted that the depth of the load, in the zone where calcination is well advanced, is not as large as that of stone in the feed end. This condition was discussed at length in the previous article but the reasons are herewith summarized.

1. The lime has decreased in volume as compared with the stone fed due to abrasion of corners and edges. In some cases shrinkage in calcination is a factor.

2. The angle of repose is less with partially calcined incandescent lime so the flow distance per revolution of the kiln is greater and the size of the load thereby further reduced.

Effect of Constrictions

The experimental work considered two conditions of constrictions:

1. A long constriction further up the kiln such as would prevail in the building up of a scale ring.

2. A narrow dam such as a nose ring at the kiln discharge. Such a dam might likewise be built further up the kiln.

Consideration of the first condition

(Continued on page 216)

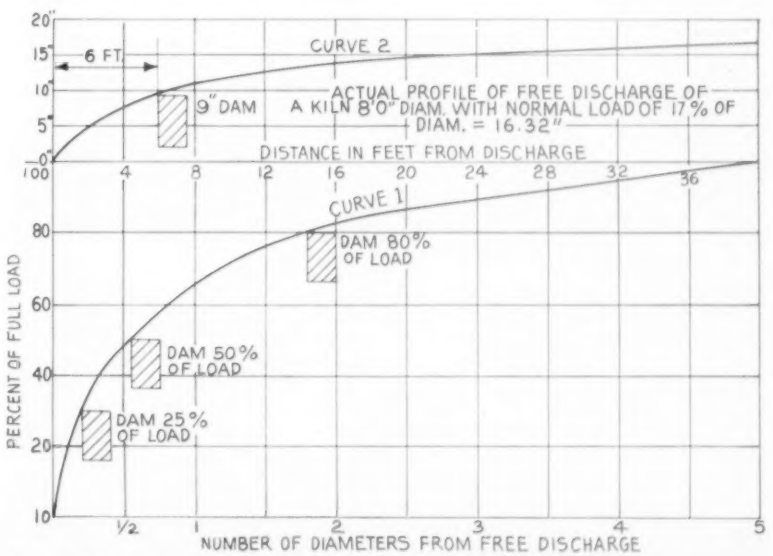
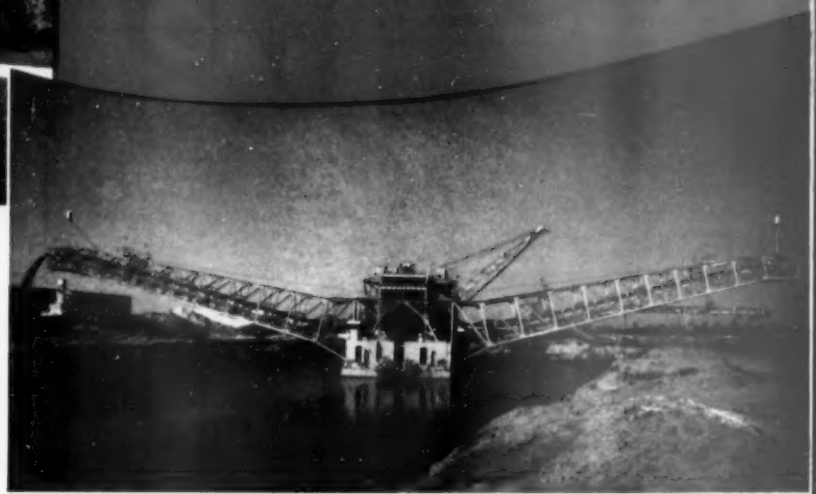

6 FT.
CURVE 2
9" DAM
ACTUAL PROFILE OF FREE DISCHARGE OF A KILN 8'0" DIAM. WITH NORMAL LOAD OF 17% OF DIAM. = 16.32"
DISTANCE IN FEET FROM DISCHARGE
CURVE 1
DAM 80% OF LOAD
DAM 50% OF LOAD
DAM 25% OF LOAD
PERCENT OF FULL LOAD
NUMBER OF DIAMETERS FROM FREE DISCHARGE

Chart 3: Average of tests at 4, 5, and 6 deg. Summing up the amount of this reducing load shows it is only 74 percent of the normal load. The loss is 26 percent of 5 kiln diameters or 1.3 diameters. With a kiln of 8 ft. diameter, this is equivalent to a loss of 1.3 x 8 ft. or 10.4 ft.

LEHIGH Manufactures from Coquina and

Floride mill a fine example of engineering. Process controls throughout all departments, and floating beneficiation plant for shell of special interest

Above: Air-conditioned office and laboratory building is attractively landscaped



Right: Floating washing and screening plant has a steel structure with two scalping screens, 12 washing screens and pumping equipment, and uses belt conveyors to handle materials. Disposal of waste sand is to one side and cleaned shell is placed into tractor-wagon units on opposite side. Span is 335 ft. from end to end of boom conveyors

LEHIGH PORTLAND CEMENT CO'S NEW PORTLAND CEMENT MILL at Bunnell, Fla., is one of the best engineered plants in the world and the first to manufacture cement from coquina shell. It is also the first plant in this country to use staurolite as a source of alumina. These raw materials presented new problems in cement manufacture.

Through exhaustive pilot plant work it was first determined that high quality portland cement could be made from these raw materials, and then a site for the plant was selected which is very favorable with respect to markets.

Florida and the southeast are a rapidly developing area that has had serious shortages of cement for many years and one that has a great future potential for concrete construction. The states into which the new mill will ship have been supplied cement mainly from mills in Alabama and Georgia. In recent years annual imports of cement into Florida from Germany, Belgium and England have been substantial. These imports of cement alone about equal the rated capacity of the Bunnell plant, which is 1,400,000 bbl. annually. At the present level of consumption, the new mill will undoubtedly be pressed to meet demands.

View of floating washing and screening plant with walking dragline in the foreground. In the background is the cement mill

No suitable limestone deposits were available in the northern Florida area selected for a plant but large banks of coquina shell were known to exist under the surface in beds paralleling the Atlantic coast. Having determined the extent of the deposits to be adequate, cement from coquina was manufactured in the pilot kiln at the company's Ormrod, Penn., plant where the central research laboratory is located and the product proved to be satisfactory by all tests, after which the decision was made to establish the plant at Bunnell.

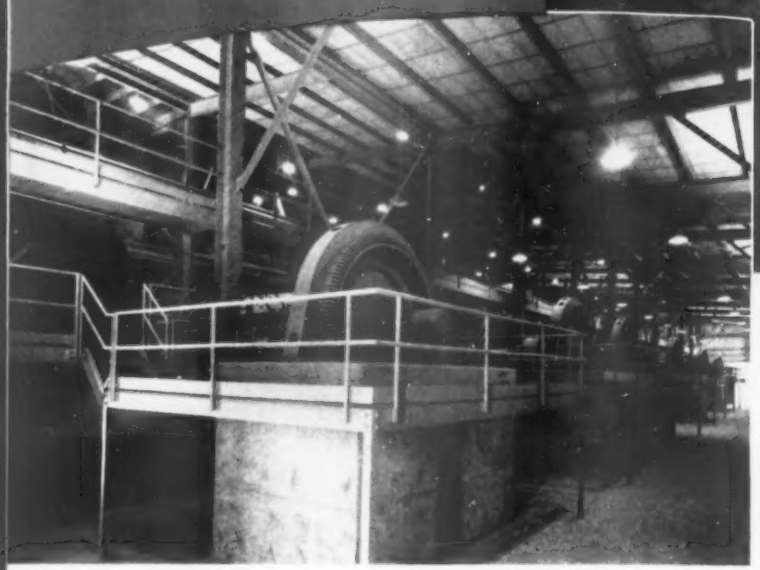
The mill is located about two miles inland from Flagler Beach. Daytona Beach is 18 miles to the south and Jacksonville is 70 miles north. A connecting spur was built from the Florida East Coast Railroad at Dorena, near Bunnell, to the plant.

A tract of land comprising some 10,000 acres was acquired, extending northward in a narrow strip, which contains the largest coquina deposit

Cement Staurolite Residue

By BROR NORDBERG

Above: Aerial view of plant. Barge is on right. Note L-shape plant design with kilns forming one leg and covered storage the other. In foreground are oil storage tanks



Left: All ball mills are driven through extension shafts by 700-hp. synchronous motors

known in this country, with a supply estimated to last 100 years. The property parallels and is alongside the Atlantic Intracoastal Canal, which permits receiving fuel oil by barge and which will permit shipping cement by water in the future. Practically all production is presently being shipped by rail. The company has docksite property on the St. Johns river in Jacksonville and may later ship cement by water into Jacksonville for storage, packing and reshipment.

The plant cost approximately $15 million and was designed for a daily production of 4000 bbl. which is the rated output from two 10½- x 380-ft. wet process rotary kilns. The company was granted a DPA certificate of necessity from the government because of the cement shortage in the southeast and is permitted accelerated amortization of the physical assets to the extent of 70 percent of the costs over a 5-year period.

This plant is proof that the cost to build a well-engineered new portland cement plant at today's prices has soared to $10 per barrel of annual capacity.

Plant Design

All the latest technical developments and control devices to produce high quality cement at favorable costs have been incorporated into the design. The plant was built of substantial construction throughout all departments and with provisions to permit ready expansion to 50 or 100 percent greater production while still maintaining its basic design.

Layout is an L-shape, with the kilns constituting one leg; and with the mill building and the parallel, adjoining covered storage area comprising the other leg. The covered storage area is identical in design to systems installed within recent years in major re-building of other company plants (See ROCK PRODUCTS, August, 1950, pg. 136, August, 1951,

Walking dragline with 10-cu. yd. bucket is shown discharging drained material into 200-ton receiving hopper

pg. 144, for descriptions of practices at Fordwick, Va., and Mason City, Iowa), and provides storage for all raw materials, clinker and gypsum. It is the key to economical material handling and basic to the L-shaped layout. Both the raw and finish mill departments are housed in a single, long building, drawing feed for the mills from overhead bins within the storage area, which has overhead travelling cranes to fill the live feed bins. It requires only three men to operate the entire mill department.

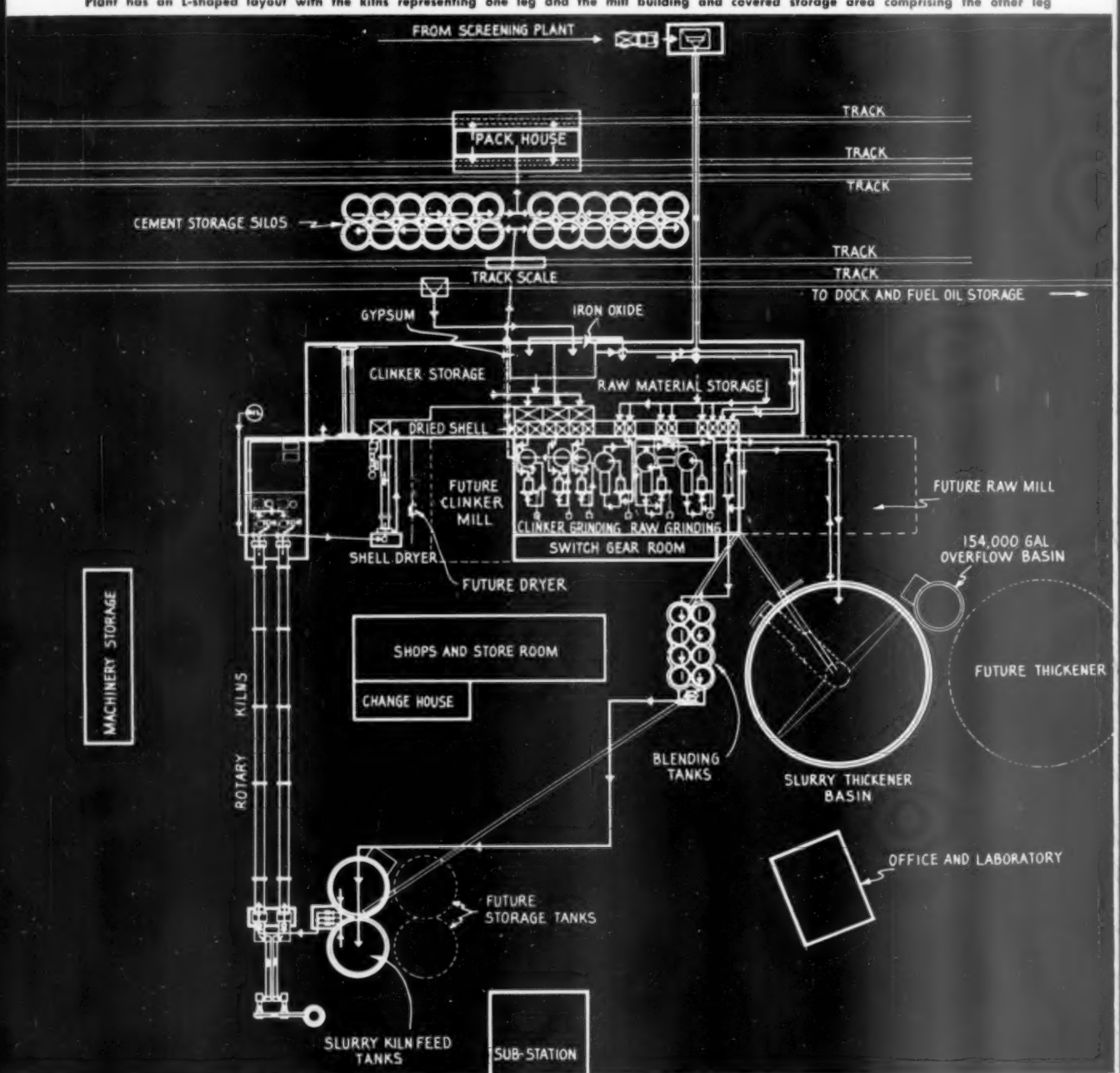
Within the basic L are the slurry thickener and blending tanks closeby the raw mill department, the shops and store room, change house, the office and laboratory building, kiln feed tanks, and a rotary shell dryer. This dryer is required in the manufacture of masonry cement and parallels the kilns, receiving its feed from a hopper in the storage area and discharging for belt conveyor delivery back into the storage area.

Both the raw and finish mill departments have excess production capacity for two-kiln operation which is an advantage in event of breakdowns and for maintenance. One or two additional kilns could easily be installed to increase clinker production by 50 or 100 percent as may be seen on the accompanying layout drawing. Space has also been provided in the basic design to double thickening capacity and kiln feed tank capacity. The mill building may be extended in either direction to accommodate added raw and finish mills, and the covered storage area can be enlarged accordingly. Machine storage is provided for in a building outside the L, as are the cement storage silos and packhouse which parallel rail trackage.

Construction of the mill buildings is of reinforced concrete and structural steel, with concrete slabs for the roofs and corrugated cement-asbestos siding. Stairways and landings throughout are of steel grating and emphasis has been given to safety in the use of substantial railing and guards. Walls of the air-conditioned office and laboratory building are of concrete masonry construction and the roof is of precast concrete tile.

The general area is swampy marshland but the plant is located on a high area between swamps. Piling was considered at first for support of the main structures but there is no firm foundation underneath, which would have required the use of skin friction-type piles with spread foot-

Plant has an L-shaped layout with the kilns representing one leg and the mill building and covered storage area comprising the other leg



ings at the surface. Use of piles was ruled out because, beneath the coquina beds there is a layer of compressible clay, and a system of support was desired which would put minimum stress on the clay layer. Accordingly, reinforced concrete spread footings were placed, resting directly on the coquina beds, to support the silos, blending tanks, kiln feed tanks, kiln supports and other heavy structures. Much of the cost of plant building, thus, is below the surface.

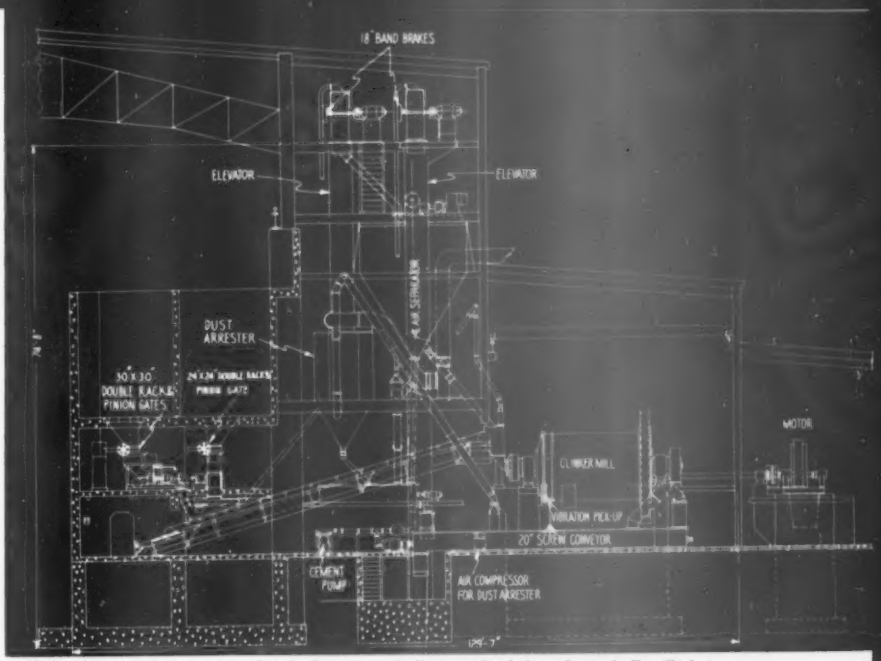
F. L. Smidth & Co. was designing and consulting engineer for the entire project and supplied the kilns, grinding mills, rotary dryer, process control panels, feeders and much of the other equipment and controls. Smidth had a resident engineer on the job for a two-year period, from the time construction began in April, 1951. Production of cement started in the fall of 1952. Walsh Construction Co., New York, and Duval Engineering and Contracting Co., Jacksonville, Fla., were the principal contractors.

In order to facilitate repairs and maintenance and to help on inventory, much of the equipment throughout the plant is of standardized design and supplied from a limited number of manufacturers. General Electric Co. supplied the electric motors, switchgear and all the electrical distribution equipment with the exception of the main incoming transformer station and one large motor. All gear reducers and couplings with the exception of certain reducers on the coquina washing and screening plant are of Falk manufacture. The screening and washing plant has W. S. Tyler washing screens, Hewitt-Robins belt conveyors and belt feeders, and Jones speed reducers. Hewitt conveyor belting is used throughout the cement plant, Chain-Belt Co. supplied the bucket elevators and belt conveyors, Bethlehem Foundry and Machine Co., the screw conveyors, Leeds and Northrup Co. the bulk of the specialized instrumentation for the kilns, all slurry pumps are Wilfley manufacture, and Fuller Co. furnished the clinker coolers, all alleviators, airslides and cement pumps.

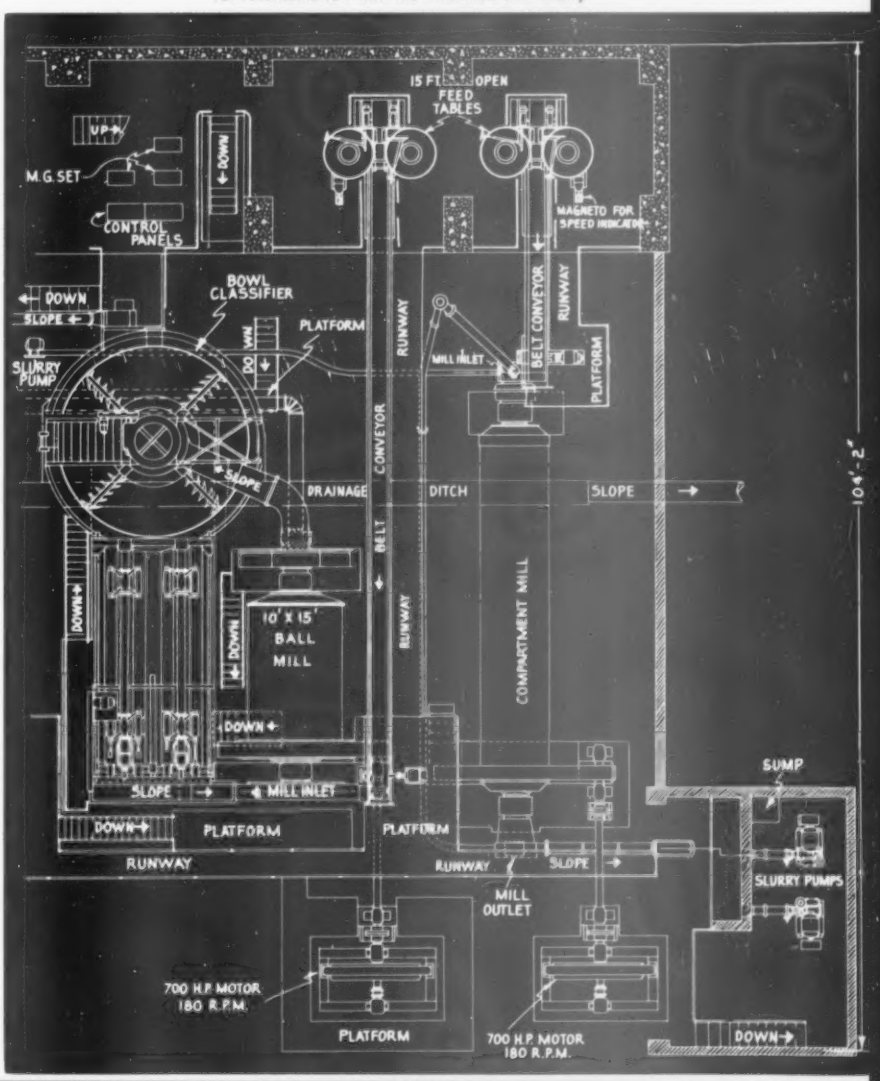
Special Features

The plant has many features of special interest. Among them are the following:

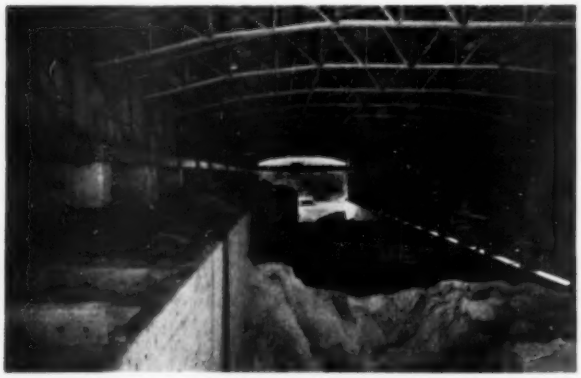
1. Use of coquina and staurolite as raw materials
2. Screening and washing of coquina
3. Control of proportioning and use of a four-component mix
4. Material handling in storage
5. Controls for slurry density
6. Single stage closed-circuit grinding of clinker with large circulating loads
7. Instrumentation
8. Electrical power distribution and switchgear
9. Extensive use of labor-saving, powered material-handling equipment



Clinker is ground into cement by single-stage grinding, each of three large ball mills being operated in closed circuit with a mechanical air separator. One of the grinding circuits is shown here in elevation



High and low calcium carbonate shell are proportioned into three raw grinding circuits, each consisting of a large ball mill in closed circuit with a rake-bowl classifier like the one shown on the left. Slag and Staurolite are proportioned and ground in the compartment mill on right for recombination with the thickened shell slurry



In covered storage, transfer is made by overhead cranes into appropriate feed hoppers paralleling the mill building wall. Feed for grinding mills is drawn from these feed hoppers

10. Electrical interlocking of sequence equipment
11. Use of standby duplicate, installed equipment, such as extra slurry pumps, throughout to protect against breakdowns.

Raw Materials

Coquina consists of the shells of mollusks which were laid down many centuries ago. Shells are ¼ to 1 in. in length, are pink-brown in color and much of them are fragmental. Fragments are lower in carbonate than the unbroken shell.

According to geologists, the deposits in Florida had their origin when part of the east coast of the state was covered by a shallow sea. The shore line then lay some 20 miles west of St. Augustine and 75 miles west of West Palm Beach in southern Florida. Mollusks came into the shallow water to spawn and then died, leaving large banks of shell paralleling the shoreline.

Extending north from the Lehigh plant there are three such north-south parallel banks. They range from 800 to 2000 ft. in width, have a depth of from 30 to 50 ft. and extend northward about six miles. An average of about 12 ft. of overburden covers the banks.

This material in its consolidated form was used as a construction material in the early development of Florida and may be seen in air-dried, block forms in the walls of old Fort Marion in St. Augustine. It is still used widely as road-base material since it has a tendency to stabilize, and is sold as stock feed and in fertilizers.

Coquina is relatively easy to excavate but it is expensive to process and presents troublesome operating problems. It is hard to grind and is inter-mixed with fine beach sand of uniform size in the average ratio of about one part coquina to three of sand. This necessitates a very thorough job of washing, using large quantities of water under high pressure to separate the sand from the shell. Approximately 17 percent of the electrical power demand for the entire plant when running at peak load is required in the excavating and in the screening and washing of the shell.

Due to the heavy proportion of beach sand and the hardness of the shell itself, abrasion of chutes and downspouts throughout the screening and washing plant is considerable. The shell is much harder to grind into slurry than most limestones commonly used for cement manufacture. Approximately 10 kwh. of electrical power is required for raw grinding, per barrel of cement produced, which figure includes thickening and delivery into the kiln feed tanks.

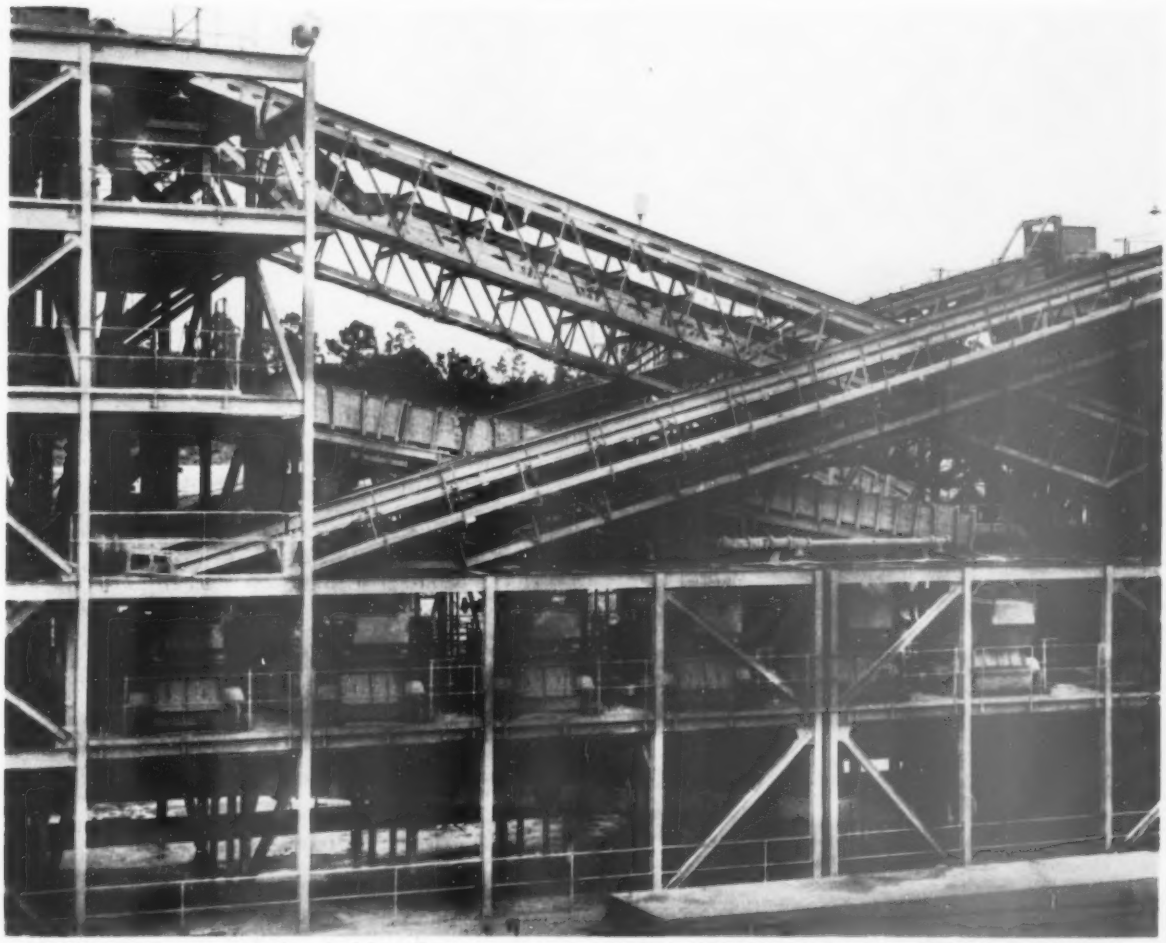
If all sand were washed from the shell, the calcium carbonate content would test 93-94 percent, but washing is regulated so that sufficient sand is left inter-mixed with the shell to approximate the silica requirements. This is done by operating the washing plant to produce a high and a low shell product which are proportioned and adjusted to yield an 83 percent calcium carbonate (sand and shell) slurry as delivered to the thickener. The holding point for kiln feed after blending with additives to supply the required alumina and iron, is 77 percent $CaCO_3$.

Shell plus sand add to 555 lb. of the 600 lb. of total raw materials needed to produce a barrel of clinker. This requires a daily production of 1600 tons which necessitates the disposal of 4800 t.p.d. of beach sand on the average. The shell washing and screening plant is operated five 8-hr. days per week.

In order to assure adequate supplies of raw materials, the company purchased 500 acres at Warm Springs, Ga., as a source of kaolin.

The staurolite residue used in the mix for alumina and part of the iron requirement, at the rate of about 30 lb. per bbl. of production, is composed largely of staurolite. This mineral is a crystalline, iron-aluminum-silicate which is a by-product of the ilmenite

Washed coquina is delivered to a receiving hopper by tractor-wagon combinations carrying 30 cu. yd. per load. They are quick-discharge units. The conveyor transports the coquina to the covered storage area



Two scalping screens are overhead to the left on floating washing plant. Sand is washed from shell over two banks of 12 re-pulping type washing screens. Washing is adjusted to retain the desired amount of sand in shell. Sand is collected in flume below and pumped to waste

plant of the Humphreys Gold Corp. (controlled by du Pont) at Starke, Fla. This material is jet black in color and looks much like moist gun powder. The chemical formula of staurolite is $Fe(AlO)_2(AlOH)(SiO_4)_2$. Specific gravity is about 3.7 and hardness is 7-7.5. As delivered to the plant the requirement is that the residue contain a minimum of 45 percent alumina, and no less than 57 percent $Fe_2O_3 + Al_2O_3$. The balance is SiO_2.

The sieve analysis averages 100 percent passing a 30-mesh sieve, with 7.6 percent from 30 to 50 mesh, 79.3 percent between 50 mesh and 100 mesh, and 12.9 percent passing the 100 mesh and retained on the 200-mesh sieve. It is hard to grind, resembling quartz in its grinding characteristics.

Because of its high specific gravity, the staurolite is proportioned and ground separately with the fourth raw material which is a high iron slag from the Copper Hill, Tenn., plant of Tennessee Copper Co. These materials by-pass the thickener. The slag contains about 59 percent Fe_2O_3 and 30 percent SiO_2 with small amounts of Al_2O_3, CaO and MgO. Slag represents about 15 lb. of the raw mix per barrel of production. Both slag and staurolite are shipped in by rail.

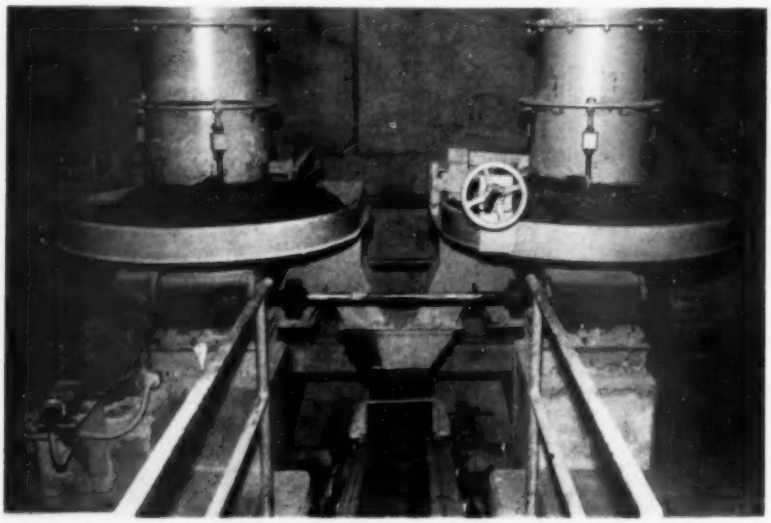
Grinding of these raw materials in closed circuit must be finer than the average for the cement industry, to 96 percent passing a 200-mesh sieve as compared to the usual 90-92 percent. Hot zone temperature in the kilns is only slightly greater than for most kilns but draft is carried for harder burning at elevated temperatures. The time-temperature requirement likely will limit kiln speeds to a figure not to exceed 65 r.p.h. Whereas the kilns require very fine ground materials in order to combine the separate components, this makes the thickener operation critical, which requires careful control of the raw grinding.

Separate grinding of staurolite and slag as two separate raw materials plus the use of relatively pure free silica and high calcium carbonate shell permits almost ideal mix control through the combination of four separate components. Proportioning and control problems are much more difficult in the average plant where they have no relatively pure components like at Bunnell and must mix and blend two raw materials in which the alumina and silica occur in variable silicate combinations.

Washing-Screening Plant

After first considering the possibility of a bucket dredge for excavation and washing, it was decided to build a floating washing and screening plant to be fed by a dragline excavator, and to use trucks to haul washed shell to the cement mill. A barge plant was built that represents 15 percent of the total cost for the entire project. Actually, the production of cement requires not only a cement mill but a beneficiation plant that is a separate and major operation in itself.

The barge was built by the Bethlehem Shipbuilding Co. at Staten Island, N.Y., towed to Reedy Island, Del., and then through the Intra-



High and low calcium carbonate shell are proportioned by separate 60-in. turntable feeders to a belt conveyor feeding each of three ball mills

coastal Canal. It measures 220 ft. in length, 44 ft. beam and 9 ft. in depth. Limited bridge clearances restricted the beam so it became necessary to attach stabilizing pontoons after production started. The barge weighs 1100 tons light and 1400 tons with its superstructure. Four stabilizing pontoons weigh 17½ tons each.

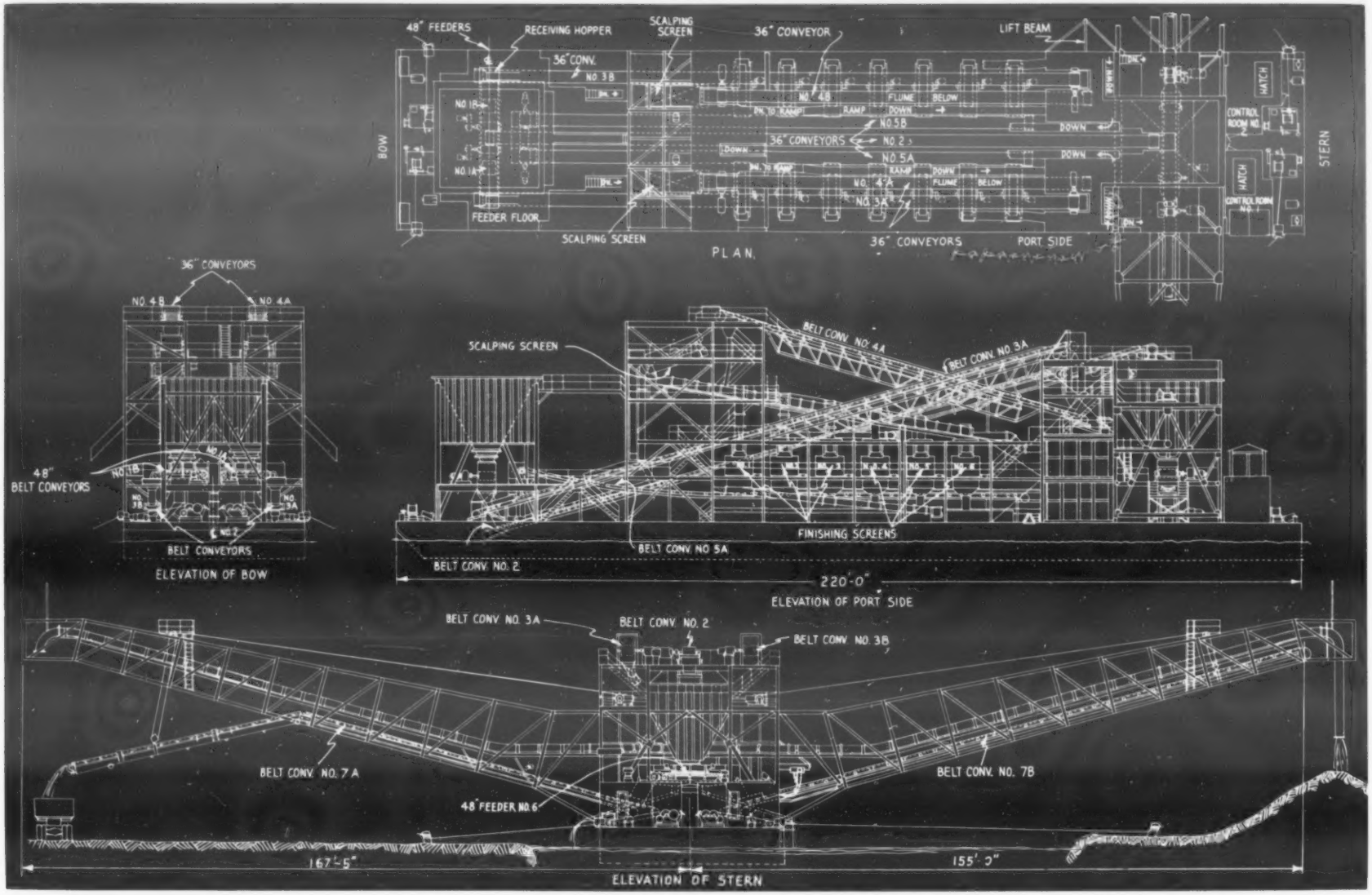
After reaching the plant, the superstructure was erected by Walsh Construction Co. according to specifications of Hewitt-Robins Engineers who designed the washing and screening plant and supplied the conveyors and related feeders. An operating basin had to be dug in advance and then a canal was dug to the Inland Waterway in order to float the barge into the operating area. Then a dam was built across the temporary canal.

The water table (fresh water) is 5 to 6 ft. above sea level and excavation is being carried as much as 40 ft. below the water surface. Excavation and stripping are alternately done by a 9-W Bucyrus-Erie Monighan walking dragline with 10-cu. yd. bucket and 165-ft. boom. Present plan of operation is to excavate from No. 2 coquina bank, and work north from the plant. Waste is pumped back into the worked out area. At first, the dragline discharged shell directly into a feed hopper on one end of the barge but the material was so water-logged that the practice had to be discontinued. Excavated material is now piled up to drain for a day and then is re-handled into the hopper.

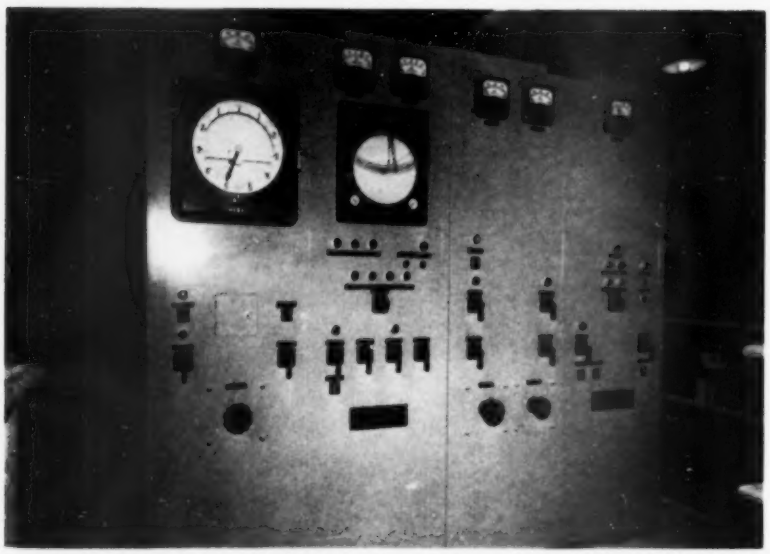
The screening and washing plant is an imposing structure built entirely of steel. At one end there is a 200-ton divided receiving hopper and at the far end there is a washed shell hopper of 150 tons capacity. There are two vibrating scalping screens and 12 washing-sizing vibrating screens and all handling is done by 36-in. belt conveyors. All structures were designed to withstand 125 m.p.h. winds as a safeguard against hurricanes. The flow is of flexible design to meet changing conditions in the material and so as to adjust the rate of production. One-half of the plant could be operated, or capacity be still further reduced by cutting out or by-passing washing screens.

Shell is fed over a 24-in. sq. opening grizzly into the receiving hopper. Any stumps or other large waste encountered is caught by the grizzly. Below each half of the divided hopper is a 28-ft. x 48-in. transverse reversible belt feeder. These feeders

All grinding mills are under one roof. Finish mills are in back end of building and raw mills with bowl-rake classifier units are in foreground



Plan and elevations of floating washing and screening plant. The plant is fed by a 10-cu. yd. walking dragline, and the washed shell is loaded directly into tractor-wagon haulage units, with disposal of sand and water on the opposite side of barge



Control panel for one of raw grinding ball mills and tube mill. Individual panels like this are used throughout plant

(1 and 1A on the accompanying drawing), when run toward the sides of the barge, regulate the flow to separate belt conveyors (3 and 3A) on 150-ft. centers, when washing shell. Each of these conveyors transfers to a second conveyor, 92-ft. centers, (4 and 4A) which returns the material overhead to the scalping screens. Total elevation gained by the two belt conveyors is 67 ft.

The scalpers are 5- x 14-ft. double-deck, type F-900 Ty-Rock screens carrying 1¼- and ⅜-in. sq. mesh on the top and bottom decks, respectively. A heavy stream of water is applied on each screen. Roots, trash, large sea shells, etc., are sent overboard from the top decks of these screens.

Shell retained on the bottom decks is chuted, from each of the two screens, to a 168-ft. centers belt conveyor (No. 2) for delivery into the washed shell hopper at the far end of the barge.

Sand and shell passing the ⅜-in. screen cloth are delivered from each screen to a bank of six washing screens through separate wood launders, each launder being equipped with six regulating gates which divide the stream over 4- x 12-ft. single-deck, type F-600 Tyler trough washing screens. These screens are of the repulping type, with five levels, and carry 20-mesh stainless steel Ton-Cap wire. Heavy volume of wash water is applied under 75 p.s.i. pressure to wash the sand from the shell, over these screens, the water being directed through the stream of material as it cascades into each successive trough for maximum washing action.

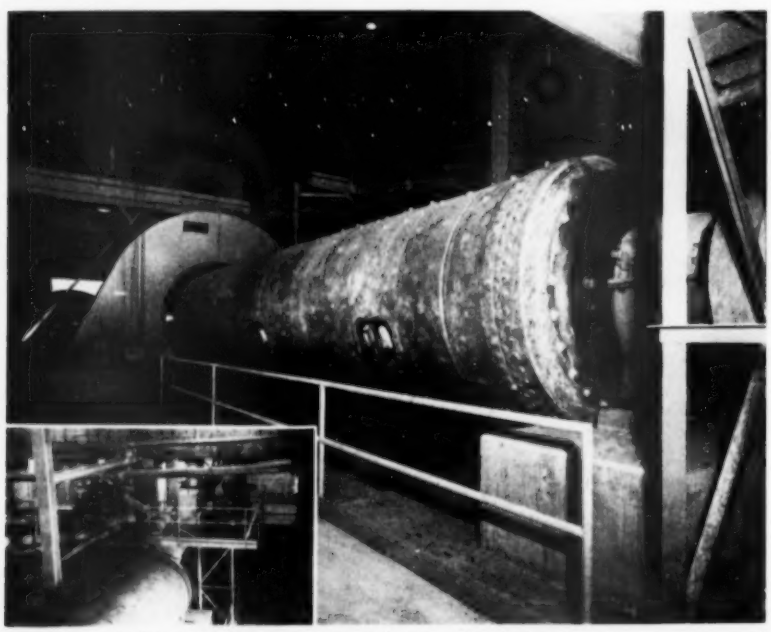
Each bank of six screens, one on each side of the barge, discharges shell to a 125-ft. centers belt conveyor, (5 and 5A) both of which transfer to the previously mentioned 168-ft. centers conveyor (No. 2) which delivers into the washed shell bin. Waste sand and water through the fine wire flow through launders into a sump and are pumped to waste in the worked out basin.

Below the washed shell hopper is a 48-in. x 42-ft. reversible belt feeder (No. 6) which can deliver shell at a controlled rate to either of two transverse boom conveyors, depending upon which side of the barge is alongside the disposal basin. These conveyors (7A and 7B) are on 151-ft. centers and are supported on structural steel booms 155 ft. in length extending outward from either side of the hopper. Each boom has a hinged boom end which may be lowered or raised to permit adjustments for variations in grade when trucks are loaded, and above the conveyors, are specially-made 18-in. diameter rubber pipe lines. It is through these pipe that the waste sand and water are pumped to disposal. All chutes and downspouts in the washing plant are rubber-lined to protect against wear which otherwise would be excessive.

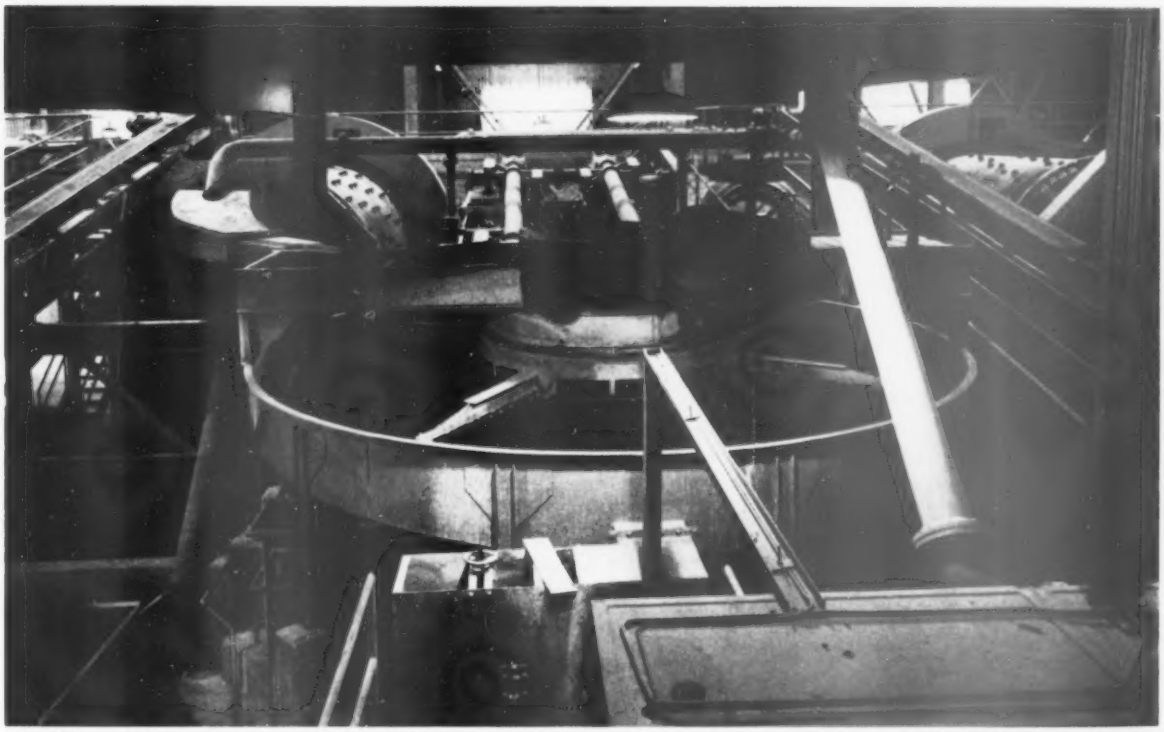
Span from end to end of the two boom conveyors measures 335 ft. which necessitates equalization of the loading to minimize listing of the barge. Disposal of sand and water is on the off-shore side while shell is being loaded out on the opposite side into trucks for plant delivery. The pipe not in use at any time is capped, vented and kept full to equalize the weight on the other side.

When it is desired to dispose of overburden the two reversible belt feeders beneath the receiving hopper are run in the opposite direction toward the centerline of the barge, to by-pass all the screens for direct transfer on to conveyor No. 2 which fills the hopper at the opposite end. Thus, the washed shell boom conveyors serve also to dispose of overburden. If the shell-sand proportions in the matrix should be such that $CaCO_3$ content be 70 percent or higher, the stream could be by-passed the washing screens entirely by reversal of the belt feeders, for direct loading into the clean shell hopper and transfer into trucks.

As mentioned earlier, a controlled



Staurolite and slag are proportioned separately from the shell and sand, and are ground through this two-compartment mill for re-combination with thickened shell slurry. Inset shows feed end of two-compartment mill; part of thickened shell slurry stream is put through this mill



Each of three 10-ft. diameter by 15½-ft. ball mills for grinding high and low $CaCO_3$ shell is in closed circuit with a bowl-rake classifier. The overflows are pumped to a thickener and oversize is returned into the mills

amount of sand is intentionally not washed from the shell but is retained as the main source of silica in the raw mix. This is accomplished by shutting off or turning on various numbers of the many washing sprays over the screens. The $CaCO_3$ analysis can be changed over a range of 70 to 92 percent by so doing. Practice is to produce a high-lime shell and then a low-lime shell at alternate intervals, for proportioning in the raw mills to about 83 percent $CaCO_3$, the ideal being to produce high- and low-lime shell a few percent equally above and below the holding point.

Tremendous quantities of water are required for washing. A Morris double-suction centrifugal pump with 24-in. suction and 20-in. discharge supplies wash water through a 20-in. main header at the rate of 12,000 g.p.m. against a 175-ft. head. Its drive is a 700-hp. Electric Machinery Manufacturing Co. synchronous motor. An 18-in. Morris sand pump, rated at 13,000 g.p.m. in pumping against a 48-ft. head, disposes of the waste. It is driven by a 500-hp. slip-ring motor.

Power requirement for this operation is 1200-1300 kw. which compares with 7000 kw. for the entire plant at peak load. Total connected horsepower in motors on the barge is 1500. Drives on the belt conveyors are direct-connected gearmotors, which incidentally are used wherever adaptable throughout the entire plant instead of chain and sprocket drives.

Main conveyor (No. 2), delivering shell into the clean shell hopper, has a ratchet hold-back and the feeder to the boom belt conveyors has a limit switch so that, should the belt run empty, all the conveyors back to the receiving hopper will automatically stop in sequence.

Washed shell is delivered to a receiving hopper for transfer into the covered storage area, by two of three DW-20 Caterpillar tractors pulling W20 wagons, which at present have a one-way haul of about one-quarter mile. They are rated at 17 cu. yd. struck capacity but have side-boards and carry heaped loads of 30 cu. yd. The operator fills his truck-trailer by pulling a cord at the end of the boom conveyor which starts and stops the

Two kiln feed tanks, holding 14,000-bbl., sufficient for three days of kiln operation

loading belt. These trailers discharge practically instantly into a hopper, beneath which two belt feeders (also Hewitt-Robins) deliver to an inclined belt conveyor which discharges into the east end of the covered storage area.

Covered Storage

All the raw materials, the dried shell for masonry cement manufacture, gypsum and clinker are stored under a single roof. The storage building is 504 ft. long of which 441 ft. is under cover. Two 10-ton Bedford overhead traveling cranes with 3-cu. yd. Hayward buckets for handling in storage are operated on rails with 96-ft. centers. Adjoining the south side of the storage area is the mill building, the arrangement being such that live storage feed hoppers filled by the cranes are directly over the mill feeders.

The four grinding mills for raw material are in the east half of the mill building, and the three for grinding clinker are in the west end, all seven in a row paralleling the covered storage area.

Staurolite residue, slag and gypsum are received by rail in hoppered cars which discharge into a track hopper. A 60-in. Syntron vibrating feeder regulates the flow to a cross belt conveyor which transfers to an inclined belt conveyor for delivery over the storage area. There, a transfer is made to a reversible horizontal shuttle belt conveyor, paralleling the building, which discharges into storage.

The storage system is very flexible and provides for large tonnages of materials. It is necessary that staurolite and slag be kept under cover but shell and clinker, if desired, can be over-flowed into the area not covered by the roof. Any one material can be stored in any part of the storage area but practice is to have each adjacent to the point of use. Transfer is made by the overhead cranes into the appropriate feed hoppers paralleling the mill building wall. From east to west within the mill building are the mill which grinds staurolite and slag, three mills which grind the proportioned high lime and low lime shell, and three mills to grind cement.

The pair of feed hoppers for staurolite and slag hold 53 tons and 75 tons, respectively. Each of the shell-grinding mills has high- and low-lime feed bins of 60 tons capacity. There are three feed hoppers serving each of the finish mills. One holds 1200 bbl. of clinker, the second has 110 tons capacity for gypsum and the third is for 100 tons of dried shell, which is interground in the manufacture of masonry cement. In addition there is a 52-ton shell hopper from which the rotary dryer is fed by table feeder and a storage compartment set aside for dried shell returned from the dryer into storage by belt conveyor.

Raw Grinding

Raw grinding consists of two separate operations. High and low calcium carbonate shell are proportioned and ground through three ball mills, each in closed-circuit with a Dorr bowl-rake classifier. The overflows from the bowl classifiers are pumped to a single thickener.

Staurolite and slag are similarly proportioned and ground, together with a fraction of the thickener underflow, through a two-compartment tube mill in open circuit. Discharge from this mill and the main bulk of the thickener underflow are inter-mixed and pumped from a common sump into the slurry mixing tanks.

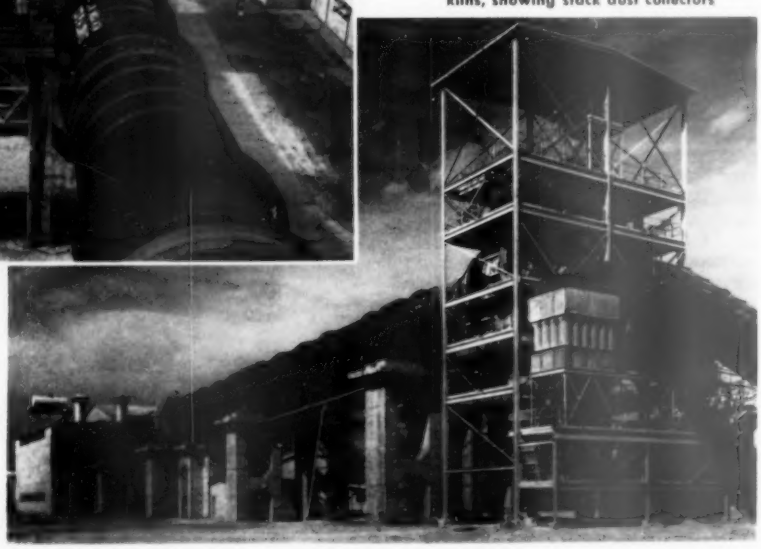
This arrangement of separate grinding operations, together with regulated flow through the mills and slurry density control devices, permits production of a slurry of uniform consistency. The use of a 4-component mix simplifies the chemist's job in adjusting and holding chemical proportions but electrical power requirement for raw grinding per bbl. of production is higher than the average for the industry as stated earlier and close control of fineness is needed for good thickener performance.

The use of a beach sand of uncombined silica, and staurolite requires that kiln feed material be ground to 96 percent through a 200-mesh sieve which fineness is achieved for the mix after separate grinding and recombination. With these materials it is important that fineness be closely controlled and that the fraction through 325 mesh be held not to exceed 70-80 percent. If the fine fraction exceeds that figure, the rate of thickening is seriously slowed. Large circulating loads, of approximately 300 percent, are carried in the three grinding circuits which aids in reducing the tendency to over-grind.

Production has been almost entirely of type I and type Ia cement thusfar

Above: Looking toward firing ends of two 10-ft. 6-in. x 380-ft. wet process kilns which produce a total of 4100 bbl. of clinker per day; storage building in background

Below: Feed end of the two oil-fired rotary kilns, showing stack dust collectors



Eight slurry mixing tanks on left. To the right is 190-ft. diameter thickener which is filled by pump with thin slurry which is the overflow from three bowl classifiers in raw mill

although recently, the manufacture of masonry cement had started and high early strength portland cement is to be manufactured. Raw mix proportions are now being regulated for a standard portland cement with approximately the following desired chemical analysis:

C_3S	52.0 percent
SiO_2	23.5 percent
Al_2O_3	4.3 percent
Fe_2O_3	3.0 percent
Silica/R ratio	3.3

It is of interest that the MgO content of the finished cement is consistently below 0.2 percent which is one of the lowest figures in the industry.

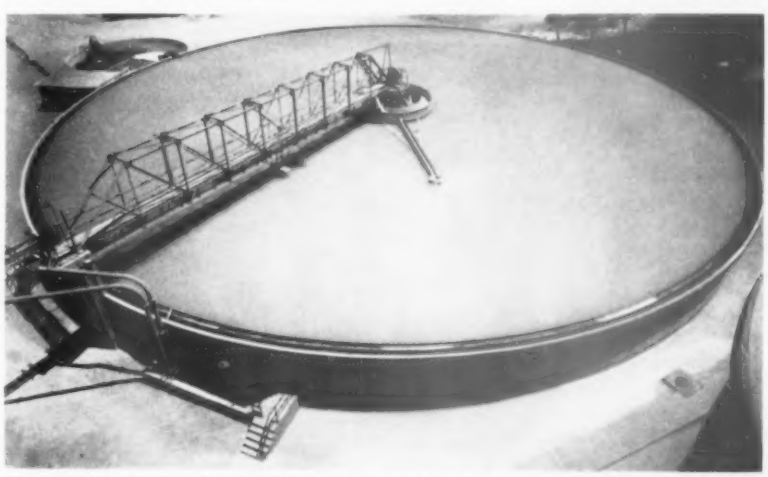
Raw Mills

The ball mills are 10-ft. diameter by 15½-ft. units, each turning on self-aligning water-cooled trunnion bearings of the ring-oil-lubricated type. They have feed scoop wheels and scoop deflectors of manganese steel bolted to their inlet trunnions, and carry a mixed charge of 56 tons of forged steel balls. Sizes of media are 1, 2 and 2½ in., and makeup charges consist of 70 percent 1-in. balls and 30 percent of the 2½-in. size. Mills are driven at 19.1 r.p.m. through gear and pinion drives, the pinion shafts being direct-connected to 700-hp., 180 r.p.m. synchronous motors through 15-ft. extension shafts. The extension shafts are connected to the pinion shafts with flange couplings and to the motor shafts with flexible couplings. All mill motors are across-the-line starting types and have no clutches.

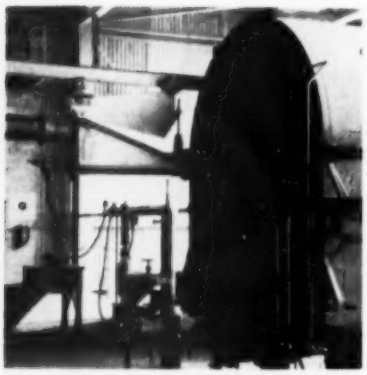
Feed into each mill is proportioned from the two feed hoppers by a pair of 60-in. diameter turn-table feeders, and the flow into the mill is by inclined feed belt conveyors. Each table is on a vertical shaft driven through a Cleveland worm gear reduction unit and the drive for the two feeders is through a third worm gear and 5-hp. d-c motor which provides adjustable speed up to 4 r.p.m. for the feeders. Each table feeder has an adjustable telescope feed pipe and adjustable scraping device. Adjustments to proportions are made by re-setting the scraper blades. Should the mills or belt feeders be stopped, electrical interlocks will stop the feeders.

Discharge from each mill is into a bowl-rake classifier unit consisting of a 12- x 37½-ft. rake and 20-ft. diameter bowl. Water is added at three points—at the inlet to the mill, in the rake section or into the bowl—the holding point being a thin slurry of 85 percent water to be sent on to the thickener. Most of it is added in the rake section and the grinding circuits are set up for accurate quantitative control of water to maintain constant circulating load and fineness of product.

Rejects from the classifier are returned via the rakes and scoop feeding device into the mill and the fines overflowing the three bowl classifiers



Thin slurry overflowing the classifiers in three grinding circuits is pumped to a single 190-ft. diameter thickener



Kilns are oil-fired through water-jacketed burner pipes in each case

are laundered into a single sump to be pumped into the thickener. There are two 8-in. slurry pumps serving this sump but only one is required to transport the slurry to the thickener. Eleven slurry pumps are provided in the raw end and, in each case where there is possibility of plugging the lines or other failure, there is a standby ready for immediate service. Duplicate equipment is provided in other mill departments also where continuity of operations is critical.

The thickener is 190 ft. in diameter, is 19 ft. in depth and has four rakes. It holds from 12,000-14,000 bbl. of slurry in process.

Tube Mill Grinding

Staurolite and slag are proportioned and fed into a No. 2211 Unidan 2-compartment mill in the same way that shell is fed into the ball mills and using similar equipment. A controlled amount of thickened slurry is put through the mill with the dry materials, sufficient to move the material through the mill and to hold down mill temperatures.

The mill measures 7 ft. $2\frac{1}{2}$ in. in diameter and is 36 ft. in length. A single manganese steel partition separates a 12 ft. $10\frac{1}{2}$-in. preliminary compartment from the 23-ft. secondary compartment. Support is on self-aligning trunnion bearings and the mill is driven at 21 r.p.m. through a gear and pinion drive, the pinion shaft being directly connected to a 700-hp., 180-r.p.m. synchronous motor. The first compartment is lined with heavy step liners of chrome molybdenum steel and the second compartment has liners of Ni-Hard iron. Loading consists of 55 tons of forged steel balls. The feed end has the same size distribution of media as the ball mills and the finish end carries $\frac{3}{4}$- and 1-in. balls.

One of two (one a spare) 4-in. slurry pumps at the thickener delivers thickened slurry into a discharge box over the feed end of the Unidan mill. These pumps may also serve to re-circulate slurry back into the thickener if needed.

An estimated 25 percent of the thickener underflow is put through the compartment mill and the balance, as regulated by valve, by-passes to the mill outlet sump. From this sump, one of two 5-in. pumps delivers the slurry, thickened to 32-35 percent water, into the blending tanks.

The compartment mill may seem large for the quantity of materials ground but staurolite is difficult to bring down to size and this mill also serves to supplement the work done in the ball mills. Fineness of the bowl effluent is 94 to 95 percent minus 200 mesh but the re-combined product sent on to the blending tanks is 96 percent passing the 200-mesh sieve.

Raw Mill Controls

Each of the three main mill circuits has an output of 25 t.p.h. and the raw department is operated on a schedule of five 24-hr. days per week.

The raw mill has operating controls and instruments that are of special interest although some of these features are not as yet being used for automatic regulation.

The thickener can be by-passed, in the event of emergency, when the ball mill product would be pumped directly into the compartment mill discharge sump for re-pumping into the blending tanks. In such event, the ball mills would be run in open circuit for a slurry with about 35 percent water.

Each mill in both the raw and finish departments is equipped with FLS mill level control units designed to maintain a constant flow through of materials at optimum rate. These units consist of a vibration pick-up and rectifier, mounted with a lever mechanism alongside each mill, and a filter unit, with capacitors, rheostats and a recorder controller mounted on each mill control panel.

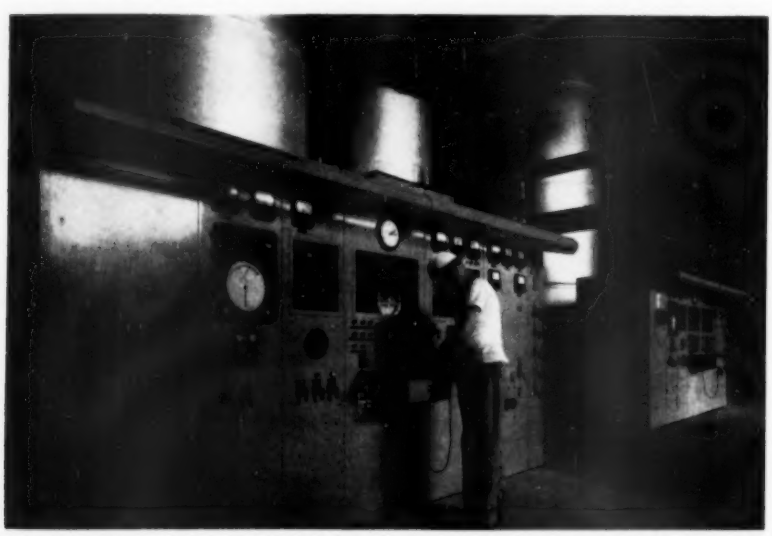
A density control system was installed for the purpose of regulating the consistency of the thin slurry as it overflows the bowl classifiers. A measure of specific gravity is taken by the density meters from the stream out of each mill circuit before they join in the common launder to the pump sump. These meters have two $\frac{1}{4}$-in. horizontal exploring pipes, or probes, spaced one over the other 18 in. apart, which project into the slurry stream. Both the upper and lower exploring pipes connect with a mud pot which catches any solids which accidentally might enter the meter piping, and it provides an outlet for any traces of air.

The exploring pipe terminate at the top and bottom of a bell-type differential meter which is coupled to a pneumatic transmitter.

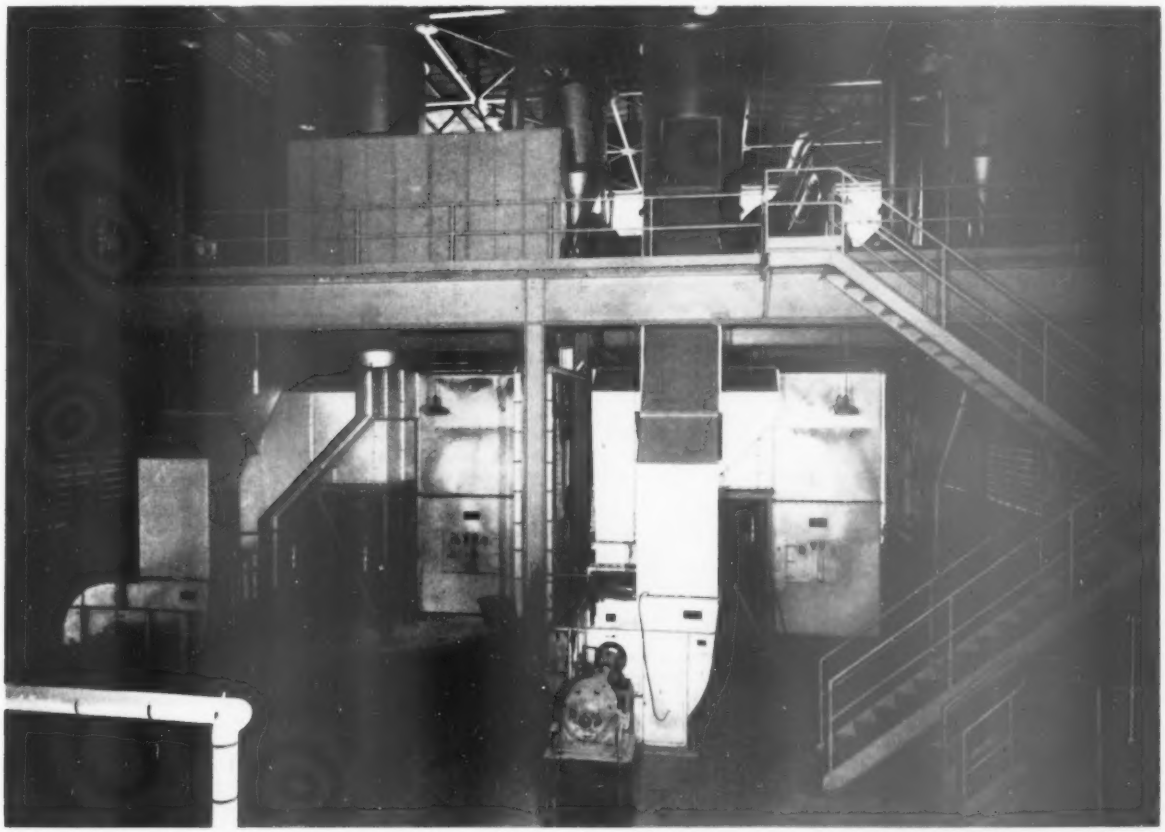
The differential meter consists of a dome, or bell, floating on mercury and the outside of the meter body must be filled with water. Water above the bell comes from the upper of the two exploring pipes while that below the bell, from the mercury to the inside of the bell, comes from the lower pipe. A needle valve in the bottom of the meter housing is opened at intervals to check for air which cannot be present under the bell.

To prevent slurry from entering by way of the exploring tubes, a water purge system is provided with the flow of water controlled by two Fischer & Porter flowrators with constant flow controllers. A minute travel of the bell floating on the mercury, caused by variation in the weight of the 18-in. column of slurry, will activate the pneumatic transmitter which is coupled to the outgoing shaft of the meter.

The transmitter has a scale graduated in degrees of density (0-400 gm. of solids per liter), and operating air is pressure regulated and filtered. On the mill control panel is a master



Central control panels for each of the two kilns have indicating and recording instruments for every operation related to firing



Clinker is discharged from each kiln over an inclined-grate clinker cooler and drag conveyors convey it into storage. Air is preheated through coolers for secondary air. View shows cyclone type dust collectors through which excess air is drawn for waste. Kiln firing floor is above

controller which indicates and records the density of the slurry, the flow of water to the mill and totalizes all the water metered. The system can be changed instantly from automatic to manual control of the water flow, to regulate the density. At present the water flow is being controlled manually.

A red ink pen records density of the slurry, and the flow of water, in the range of 200-1000 g.p.m., is recorded in blue. A knob on the controller is the means of setting the pointer to the desired control point, which is normally about 200 gm. per liter.

The automatic controller is connected with the controlled air line from the density transmitter on one side and the outgoing controlled air line to the automatic water valve on the other side; the water control valve being equipped with a diaphragm operating mechanism and a Moore valve positioner.

Through solenoids, a pilot valve is interlocked with the mill motor control. When the motor is operating, the solenoid of the valve is energized and the valve is closed. When the mill motor stops, the solenoid is de-energized and the valve opens, letting out the control air and then the compressed air over the diaphragm closes the water valve to the mill. In reverse, when the motor starts up again the controlled air builds up again and the water is started to flowing. An alarm sounds, should the water flow below the desired minimum.

Estimated flow of water to each mill circuit is 550 g.p.m. Water is delivered from a constant-head water tank at a pressure of 9.5 p.s.i., which is replenished by pump from an overflow tank which receives the flow-over from the thickener.

Raw Mill Instrumentation

Each of the three ball mill grinding circuits has an individual control panel of the dust-proof cubicle type. Among the instruments are a Speedomax mill level controller, the related vibration pickup control, Fischer & Porter flowrator and density recorder; speed indicator for the feeder; ammeter for the mill motor; rake motor ammeter; start-stop switches for the feeder motor-generator set, feeder motor, conveyor motor, bowl motor, rake motor; stop switch for the mill motor; alarm silence switch; alarm lights; indicating lights; relays; push buttons and control rheostat for the feeder speed.

Among instruments on the Unidan mill control panel are two speed indicators for the feeders; feeder speed control rheostats; ammeter for the mill motor; start-stop switches for the feeder motor-generator sets, for the feeder motors, the conveyor motor; stop switch for the mill motor; alarm switch, signal push-buttons; indicating lights; and relays.

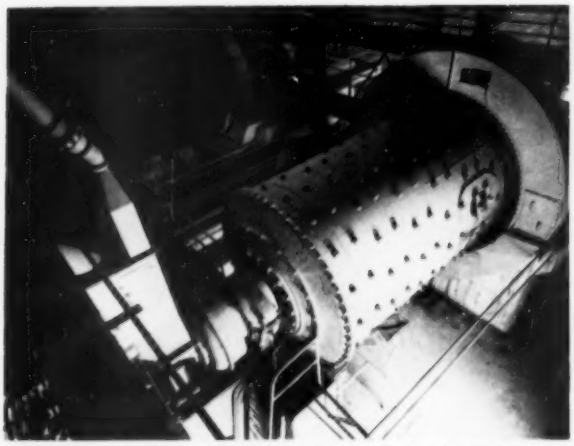
Raw Material Sampling

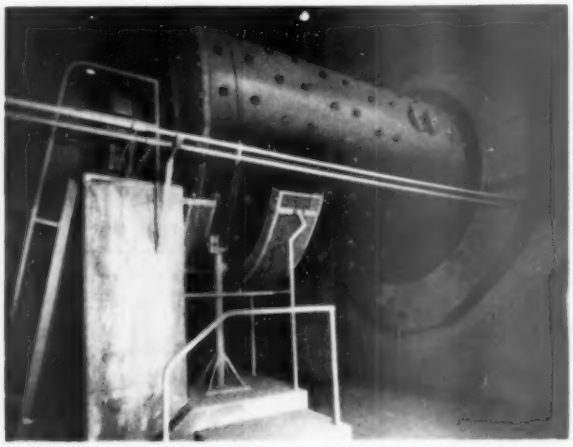
Raw materials are sampled at every step until finished slurry is fed into the kilns. Samples of shell are taken at the truck discharge hopper at regular intervals and $CaCO_3$ tests run as a guide to washing operations on the barge. A Geary-Jennings continuous sampler is the means of checking on the ball mill product. The sample is taken of the composite stream overflowing the bowls ahead of the pump to the thickener. Calcium carbonate analyses, moisture determinations and fineness tests are run from these samples at regular intervals as controls for the proportioning of shell, the addition of water and feed rate into the mills.

Grab samples are taken with a control bucket from the thickener outlet and hourly tests are run for chemical composition and moisture content. The rate of flow is also measured.

Blending

Capacity of the thickener, the mix-





Left: Cement is ground through three 10-ft. diameter by 15-ft. 6-in. ball mills, each in closed circuit with a mechanical air separator. Reject spout from air separator is seen on left. Right: Close-up of one of three finish ball mills. Mill level control device is on underside of mill

ing tanks and kiln feed tanks are each sufficient for three days operation of the two kilns. There are eight mixing tanks arranged in two rows of four with a combined capacity of 12,000 bbl. as clinker equivalent. Six of them are mixing tanks and the other two serve for correction of the mix. Pneumatic agitation is accomplished for each tank in sequence by an F.L.S. time cycle controller, air being supplied for agitation at 65 p.s.i. by one of two 14- x 11-in. Ingersoll-Rand air compressors. The second is a standby unit for emergency and can also be an alternate source of supply to the kiln feed tanks.

After a mixing tank is filled and following a 15-minute period of agitation, a complete chemical analysis is run. Blending is done by volume on a slurry inch calibration basis, by transfer of measured quantities from two or more tanks into a correcting tank. Two 8-in. slurry pumps are provided, either of which may transfer slurry from any tank into any other or send it on to the kiln feed tanks.

Two 55-ft. diameter by 25-ft. kiln feed tanks have a combined capacity of 14,000 bbl. of clinker equivalent. They have Dorr slurry mixers consisting of mechanical agitation and pneumatic agitation from air jets spaced on the rotating arms near the bottoms of the tanks. Five-inch slurry pumps (2) deliver overhead into the kiln feeders and there is a third pump for reserve. Blinking lights in the pump room and also in the blending tank pump room and on the kiln control panels are indicators that the kiln feeders are functioning. Kiln feed samples are taken at regular intervals through the day, from which a complete chemical analysis is made, and a check on moisture and fineness. A measuring pot is the means of checking the rate of kiln feed at 2-hr. intervals.

Kilns

Clinker production is approximately 4100 bbl. per day from two 10-ft. 6-in. x 380-ft. oil-fired kilns, each with separate slurry feeder interlocked with the kiln drive, separate cyclone-type stack dust collector and air-quenching, inclined grate clinker cooler.

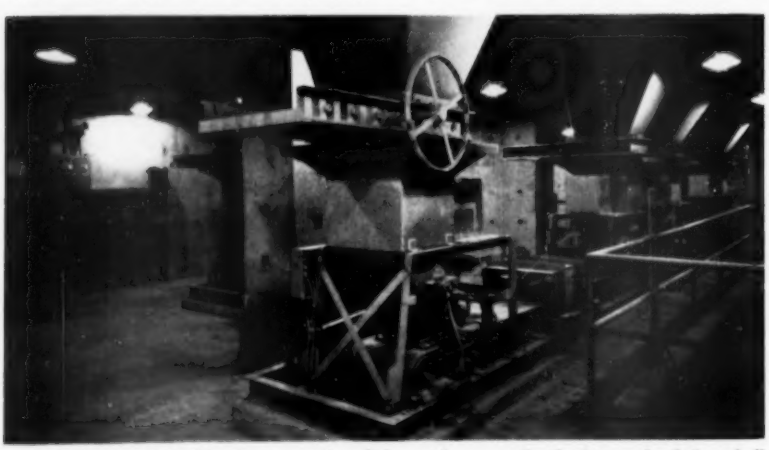
Kilns are of welded construction with five tires of the floating type. There is a thrust roller mechanism at one tire. Supporting each tire are two cast steel rollers with oil-lubricated bronze bushed, water-cooled sleeve bearings of the ball and socket type for uniform bearing pressure. Lifting buckets on the shafts are the means for oil circulation and the bearings are water-cooled. The kilns are sloped at ½ in. to the lineal foot.

They have hoppered bottom dust chambers with adjustable asbestos rope for tightening between the kiln shell and chamber. Asbestos ring plate types of seals close the gap between the movable kiln hoods and the discharge ends of the kilns. Nose rings are of highly heat-resistant segmented steel.

Each kiln has an induced draft chain system in the drying section, consisting of lengths of $\frac{5}{8}$-in. distorted chains hung in semi-circular loops from steel rings welded inside the shell. The chain sections have been adjusted to have 10-12 percent moisture nodules coming out of the chain section. That figure seems to be the ideal for sound nodule formation and for operation with a minimum of cycling and load changes.

Refractory lining consists of 1 ft. of Alusite for the nose of the kiln, followed by 35 ft. of 6-in. Magnecon basic brick, 25 ft. of 9-in. Alusite, 280 ft. of 6-in., 50 percent alumina brick and 40 percent wear-resistant brick through the chain section. Lehigh has in recent years been converting to basic brick in the hot zones at several of its plants in order to fire with a short, intense flame wherever possible.

Each kiln drive consists of a 125-hp., 1150 r.p.m. maximum speed, adjustable speed d.c. motor connected to a master pinion through a herringbone gear reducer with a ratio of 104.3:1. Connection is through high- and low-speed flexible couplings. The ratio of speed reducers and gear and pinion drives permits a maximum speed of 1.35 r.p.m.



Separate but interlocked feeders proportion clinker and gypsum for feed to each of three ball mills. A third feeder is for dried shell for masonry cement manufacture

Left: Finished cement is stored in 24 concrete silos with a combined capacity of 200,000 bbl. At the midpoint may be seen the loading station for bulk cement cars which are weighed as filled. Bulk cement may also be loaded out direct from silos. Right: Here a bulk cement car on scale is being loaded

The emergency drive is a 55.7-hp., 6-cyl. Hercules gasoline engine and single-reduction gear reducer, ratio 11.5:1, with a flexible coupling on the high speed side of the gear reducer for coupling to the engine. The low-speed side of the reducer is coupled to the high speed shaft of the kiln speed reducer. This unit will permit turning the kiln at 0.15 r.p.m. in the event of electrical power failure.

Slurry is fed into each kiln by an F.L.S. spiral scoop slurry feeder which has its drive tied electrically to the kiln drive motor. The feeder is of the single type and consists of a tank, inlet box and spiral scoop. A partition plate in the inlet box maintains a constant overflow passing through an overflow chamber in the feeder proper. Height of slurry is controlled by positioning an adjustable overflow partition, and slurry feed to the feeder is regulated by an orifice valve.

Each feeder is provided with a control bucket for timing the rate of slurry fed into the kiln (checked at 2-hr. intervals), and a dust funnel to return stack dust into the slurry vortex as fed. A paddle arrangement is the means of actuating the previously mentioned indicating lights to assure the burner that the kiln is getting uninterrupted feed. Feeders are driven through chain drives and a speed reducer from a 5-hp. motor with speed range of 11.8 to 3.13 r.p.m.

Exit gases are drawn through Multiclone dust collectors (2) by separate induced draft fans, and exhaust through a common 150-ft. Consolidated Chimney Co. brick-lined stack. Rating of the fans is 88,000 c.f.m. of gas at 475 deg. F. against a static pressure of 6 in. w.g. Their drives are through flexible couplings by 200-hp., 600 r.p.m. synchronous motors. Between the dust chamber and the fan are F.L.S. multiple louvre dampers designed to be operated by air-cylinders in connection with automatic draft control instrumentation on the control panel. A potentiometer connected electrically with a position indicator on the kiln control panel shows the position of the dampers. At present, draft is being controlled manually from the burners' platform.

The design provides for wasting the stack dust into bins or for its return into the kilns. Dust loss is low and the daily recovery is only about 20 tons from both kilns, all of which is returned into the kilns. Dust from both collectors is conveyed by screw conveyors to a central vertical bucket elevator which transfers to a second elevator for elevation overhead, two elevators being preferred to one long one in order to facilitate maintenance. Dust from the kiln dust chambers is spouted directly into the lower elevator. The choice is to spout the dust from the head of the elevator into either of two waste bins or to discharge into an overhead bin from which a screw conveyor on either side transfers the dust into the funnel to be carried into the kilns with slurry.

Clinker is discharged from each kiln over a 7- x 39-ft. Fuller inclined-grate clinker cooler. The clinker is relative-

Left: Cement in bags is handled from the packing machines by horizontal wire mesh conveyors and hand trucks are used for loading box cars. Right: Bags are received in palletized packages for handling from cars and in storage by fork lift truck

Oil for firing kilns is shipped to plant by barge and stored in large tanks

ly small in size with relatively few chunks with the result that those coolers are among very few of recent installation date which have no clinker chunk breakers. Drag conveyors (3) convey the clinker into storage at room temperature. Samples of clinker are taken from the cooler at hourly intervals and the composite sample at the end of the day is checked for free lime.

The pressure fan which forces air through the hot end of the clinker bed is rated at 38,950 c.f.m. of air which is preheated to enter the kiln as secondary air. Excess air through the upper end of the clinker grate is wasted after first being drawn through a Multiclone cyclone dust collector, which was installed to hold down dust in the interest of good housekeeping and improved working conditions. The fan is on the suction side of the Multiclone and will handle 36,500 c.f.m. at 275 deg. F. against a static pressure of 4.55 in. w.g. Between the Multiclone and the fan are louvre dampers driven through a motorized gear reducer with hand wheels provided for manual operation. Dust is spouted on to the cross drag conveyor carrying clinker.

The kilns are oil-fired, using bunker C fuel oil of 17,500 B.t.u. heat value per pound. Oil is delivered by barge and stored in two 630,000 gal. storage tanks at the dock, from which it is transferred by pump to two 20,000 gal. service tanks near the kilns. Oil is heated to 200 deg. F. by packaged units consisting of a 100-hp. oil-fired boiler and heat exchanger. The blower for each kiln has a capacity of 7500 c.f.m. at 200 deg. F. with static pressure of 12-in. w.g. and is driven through flexible coupling by a 30-hp. motor.

The burner pipe is water-jacketed, of 8-in. inside diameter, and the burner tip is readily adjustable through simple turning of a regulating pin to vary both the size of the orifice and the atomizer valve. It has a wide range of adjustment. The Engineer Co. (Anco) furnished the oil-burning, proportioning and heating equipment.

Firing is done with primary air held to 15 percent. The installation provided for drawing heated air from the kiln hood for ignition but it has not been found necessary to preheat the primary air. Firing is with a short flame of intense heat.

Each kiln has sampling devices provided below the chain system and has a thermocouple at that point with pantograph collector and a pyrometer recorder on the control panel. Cambridge gas analysers in combination with recorders on the control panels measure and record the oxygen, combustibles and CO_2 content of the exit gases.

Instrumentation

These kilns are being operated with very little dependence upon automatic devices and controls as such, but have F.L.S. centralized control panels which are highly instrumentalized with indicating and recording instruments for every conceivable phase of the firing operation. Most of the workers at this plant are inexperienced in cement manufacture so the company thusfar has encouraged the use of manual controls before depending upon some of the automatic features. The purpose is to permit the burners to gain experience so that they will know how to operate the kilns in the event that instruments fail later after instrument control has been fully adopted.

Each kiln has a separate instrument panel of the cubicle type, built of dust-proof sheet metal construction and mounted on vibration eliminators. Windows in the front panel permit observation of instruments on the back inside wall.

The following instruments are provided on each panel board:

Ammeter for induced draft fan motor

Position indicator for the louvre damper for the kiln induced draft fan

Automatic draft control equipment including draft controller

Start-stop switch for the induced draft fan

Ammeter for primary air fan

Fischer & Porter indicating and recording oil flow recorder with synchronized electric clock, direct-reading chart and totalizer

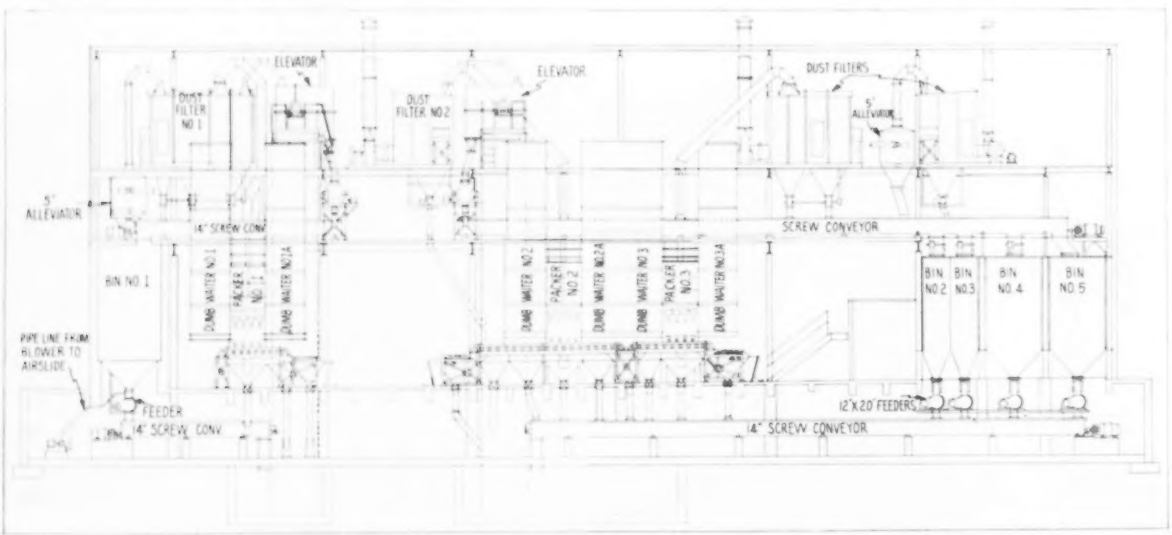
Oil pressure gauge

Start-stop switches for primary air blower and oil pumps

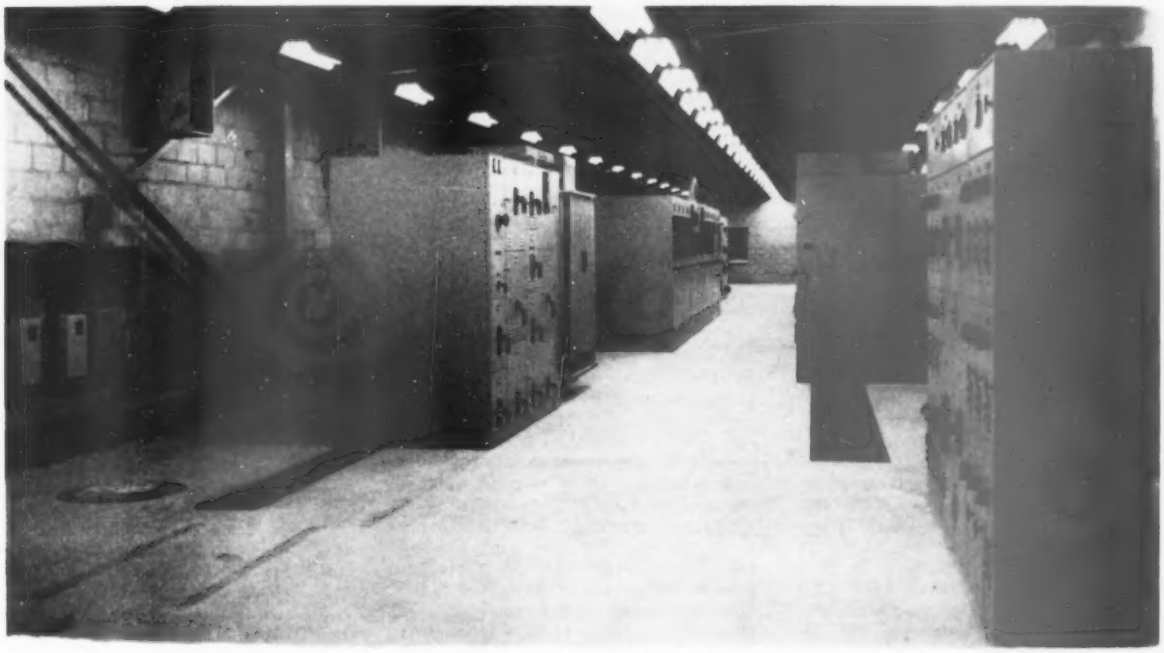
Electric clock

L & N Micromax recorder for O_2, combustibles and CO_2 in exit gases

L & N 3-point Speedomax recorder for kiln speed, feed end temperature



Schematic elevation of packing plant. Packer on left is for masonry cement and has a separate handling system



Electrical power is delivered at 4160 volts into this central power distribution and electrical control room from which power is distributed to unit substations in the various mill departments. This control room is under slight pressure with filtered air to keep out dust

and temperature as measured by the thermocouple ahead of the chain section

Hays draft recorder for draft as measured at the kiln discharge end

L & N 4-point temperature indicator, one for feed end temperature measurement, one for temperature as measured by the kiln shell thermocouple, and two points for spares

12-pt. alarm silence switch

Alarm horn

Telephone buzzer

Ammeter for clinker cooler exhaust fan

Ammeter for clinker cooler blower

Position indicator for clinker cooler exhaust fan

Reversing starter for louvre damper for the clinker cooler exhaust fan

L & N recorder for the clinker cooler

L & N control unit for clinker cooler

Start-stop switch with silence contact for clinker cooler fan

Four start-stop switches for the clinker cooler, exhaust fan, and two dust screw conveyors

Three start-stop switches for the clinker drag conveyors

Open-close switch for the louvre damper for the cooler exhaust fan

Selector switch for the clinker cooler

Ammeter (d.c.) for kiln drive motor

Ammeter (d.c.) for kiln feeder motor

Kiln speed indicator

Magnetic kiln revolution counter

Magnetic kiln feeder revolution counter

Start-stop switch for the kiln

Start-stop switch for the kiln motor-generator set

Start-stop switch for the kiln feeder

Kiln speed rheostat

Four start-stop switches for the two dust elevators at the feed end of the kiln and two dust screw conveyors

Start-stop switch for the dust feeder

Red, green, white and amber indicating lights

Alarm, auxiliary and interlock relays

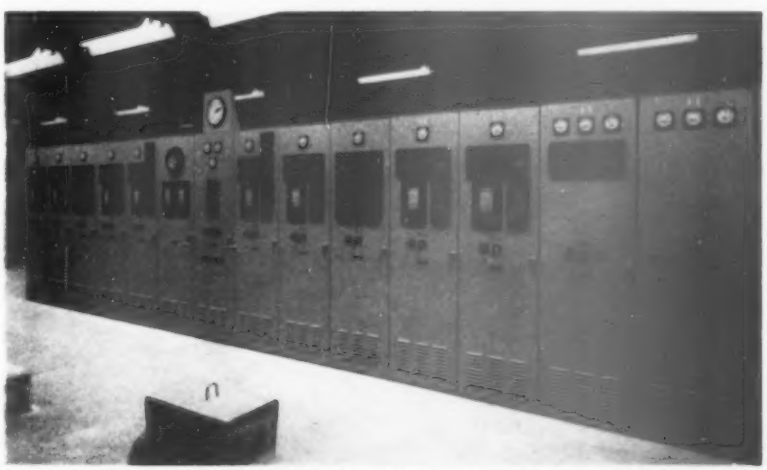
Kiln safety stop relay

Telephone pushbutton and jack, and telephone hand set

These centralized control panels provide a complete picture of all operations from the point of feed of slurry into the kilns to the delivery of clinker into storage; and a complete record of critical temperatures, exit gas composition, fuel flow and draft which of course are the main factors in firing.

Kiln Firing

While instruments and controls are provided to permit certain automatic operations, the only automatic firing control in use other than the tie between kiln feed and kiln speed is adjustment of the temperature of secondary air as preheated through the inclined grate clinker cooler which is through the L and N control unit. This control feature has become standardized in recent new kiln installations with air-quenching coolers,



Close-up of main distribution panel in central electrical control room

whereby temperature just above the clinker bed in the hot end is held at a constant figure, usually in the 1100-1200 deg. F. range, by a thermocouple which automatically speeds up or slows the grate speed to vary the bed thickness.

This is one of few modern plants that does not have permanently-mounted optical pyrometers, because of turbulence and dusting in the firing zone. Spot checks on burning temperatures are made by use of portable optical pyrometers and the holding point is an indicated 2700 deg. F. Temperature, as measured just below the chain section, is important to control. The holding point is about 1100 deg. F. and the limiting temperature is 1400 deg. F. as a safeguard to excessive heat on the draft fan. Consistency of the slurry at that point when maintained at 10-12 percent moisture minimizes dusting. The unusually low dust content in the exit gases is attributable to effective functioning of the chain system.

The kilns are turned at 65 r.p.h., and firing practice is to hold kiln speed constant and only vary the fuel rate when routine adjustments become necessary. Kiln speed can be varied, of course, but that is only done to compensate for large changes in kiln operation. As experience is gained with the kilns, speed may be slightly increased but likely will be limited to a figure well below that of some kilns of comparable size because the raw materials require harder burning than ordinary.

Draft is maintained at 1½ in. at the back end of the kiln and the electrically controlled dampers are opened and closed by manual but remote control at the kiln panel. Temperature of the exhaust gases averages about 500 deg. F. and the thermocouple at the back end is set to cut automatically the draft fan motor should the gas temperature rise to 600 deg. F. Combustion is controlled to maintain 2-3 percent oxygen in the exit gases. Thusfar, no difficulties have been encountered either with mud rings, or slag rings in the hot zone.

The heat requirement is presently about 1,200,000 B.t.u. per bbl., or 8 to 8½ gal. of fuel oil per bbl. of clinker, in producing 2050 bbl. of clinker per kiln per day. The figure likely will be reduced to 7½ gal. of fuel oil per bbl. after the optimum is achieved for slurry moisture, primary air and other variables influencing burning efficiency.

Finish Mill

Clinker is ground into cement by single-stage grinding through three large ball mills, each in closed circuit with a mechanical air separator. The circuits consist of 10-ft. diameter by 15-ft. 6-in. ball mills, the mill stream being delivered by screw conveyor and bucket elevator to a 16-ft. Sturtevant mechanical air separator. Rejects are spouted back into the mills and finished cement is pumped into the storage silos.

Design provides for circulating loads as high as 600 percent and about 500 percent is being carried at present. The three mills combined have a capacity of 6000 bbl. per day of type I cement (1730 Wagner surface) and thus need only be operated for two 8-hr. shifts daily to keep pace with clinker production. The over capacity was provided to permit grinding of masonry cement and for the contemplated production of high early strength portland cement.

The mills are similar to those in the raw department and are driven at 19.1 r.p.m. through a gear and pinion drive with the pinion shaft direct-connected to a 700-hp., 180 r.p.m., synchronous motor through 15-ft. extension shafts using flange and flexible couplings. They are lined with heavy step liners of manganese steel and carry a graded charge of 50 tons of forged steel balls. The ball sizes are ¾, 1, 2, 2½, 3 and 3½ in.

Each mill is equipped with a mill level control device designed to maintain constant flow into the mill which is similar to those on the raw mills, and with related instrumentation on the control panel.

Feed into each mill is from the overhead separate bins, as proportioned by interlocked Shaffer poidometers. There are three feeders to a mill, two being for clinker and gypsum and the third provided for feeding dried shell, should masonry cement be ground through either mill. If any feeder gets off-weight, all three will automatically stop.

Proportioned materials are fed into the mills by inclined belt conveyors. When type IA cement is manufactured, proportioning pumps regulate the flow of neutralized vinsol resin on to the feeder belts. Each mill has an indicating thermometer.

An Eriez magnetic separator is mounted on the reject spout from each air separator to catch any bolts or other tramp metal.

Two of the air separators discharge finished cement to a common screw conveyor for transfer to the hopper of a 7-in. Fuller-Kinyon pump for transport to the cement silos. The third discharges directly into the hopper. Finished product from two of the air separators can also be diverted by spout into the screw conveyor from the third mill and thus be elevated to its air separator for two-stage grinding in the manufacture of high early strength cement. The grinding mill circuits are vented by a 25-ft. Norblo bag-type dust collector which discharges into the cement pump hopper. Samples are taken from the finish mills by a screw-type continuous sampler and a complete analysis is run daily from the composite sample.

Each mill circuit has an individual control panel with the following instrumentation:

Speed indicator for the clinker feeder

Ammeters for the mill motor, separator motor and bucket elevator

Temperature recorder of the vapor type for recording cement temperature

Speed control rheostat for the generator voltage for the feeders

Three speed control rheostats for the gypsum, clinker and dry shell feeders

Vibration pickup control rheostat for mill level control

Mill level recorder controller

Start-stop switches for the mill, motor-generator set and belt conveyor

Start-stop switches for all driven equipment

Three selector switches for the feeders

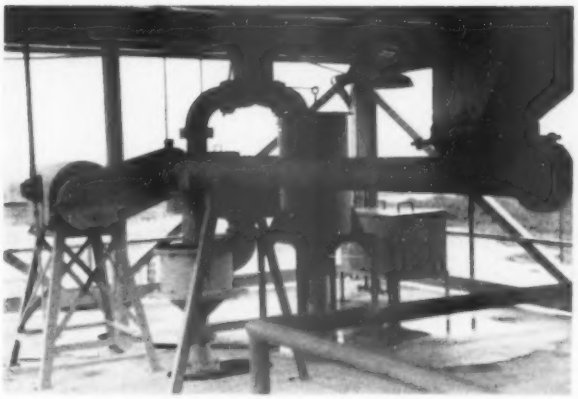
Open-close switches for the feeder gates

Relays, alarm and signalling lights, and signal push buttons

Masonry Cement

In April of this year an oil-fired induced-draft rotary dryer was placed into operation to produce dried shell for masonry cement manufacture. It was set up to be fed shell from a hopper within the covered storage area, parallels the kilns, and dis-

Rotary dryer to dry shell for masonry cement manufacture



Left: Arrangement for returning dust taken from exit gases into the kilns by mixing with slurry in funnel. Right: Individual induced draft fans for kilns exhaust cleaned air to a common stack

charges dried shell for return by belt conveyor back into the storage area. There it is re-handled as needed by the overhead crane into mill feed hoppers for proportioning, with clinker and gypsum, into the finish mills.

The dryer is 7 x 80 ft., is carried on two tire and roller supports and has a four-chamber internal cross section of special heat-resistant steel extending for a length of 51 ft. from the feed end in order to increase heat transfer. One row of flights is located directly in front of this system. The dryer is driven at a maximum speed of 116 r.p.h. through a herringbone gear reducer from a 25-hp., 1600 r.p.m. motor. Draft is supplied by a fan rated at 18,000 c.f.m. of gas at 350 deg. F. at 4 in. w.g., driven through V-belt by a 25-hp., 1160 r.p.m. motor, at 620 r.p.m.

Shell is fed into the dryer by a 60-in. turntable feeder driven on a vertical shaft through a double-worm gear reduction unit, and is dried to 1-2 percent moisture content.

Cement Storage

Finished cement is stored in 24 reinforced concrete silos arranged in two rows of twelve paralleling the railroad tracks. They have conical hoppered bottoms and together, have a capacity of 200,000 bbl. At the midpoint there is a loading station for bulk cement cars which are weighed as filled on a Howe platform scale. Cement from the finish mill may be pumped into any of the silos, a number of which have draw-offs for bulk-loading. The stream is put over a 3- x 6-ft. Selectro vibrating screen for removal of foreign material before dropping into the loading bin.

Below each row of 12 silos are draw-off screw conveyors which transfer cement to a 9-in. cement pump (2) located at the midpoint of the row. Manually-operated valves at any silo are opened to deliver cement into the screw conveyor. These pumps can deliver cement from any silo into any other one, to the packhouse or to the bulk-loading station. Fuller level controls on the gathering screw conveyors, located adjacent to the pumps, actuate a siren if the conveyors approach over-loading.

Packing

Storage and packing operations are patterned after the circulating system developed at the company's Union Bridge, Md., plant several years ago and are illustrated schematically herewith. There are three 4-spout St. Regis packing machines, one of which is exclusively for masonry cement, with its separate handling system to prevent contamination with regular cement. Both systems operate on the same principle except that there are four auxiliary storage tanks for portland cement and one for masonry cement.

Portland cement pumped from the cement silos is first put through an alleviator overhead and then is carried over the tops of the four auxiliary tanks by a 14-in. screw conveyor transferring to a second 14-in. screw conveyor which also is the means of transfer to the packing machine hoppers. Motorized valves permit filling any of the four bins by simply opening the desired one.

When packing out cement from either bin, a motorized totally-enclosed feeder at the bottom outlet is opened to release the cement by way of open top F-H airslides to a 14-in. horizontal screw conveyor for transfer overhead by bucket elevator. The stream is discharged from the elevator over a 2- x 5-ft. Selectro vibrating screen to remove foreign matter, and discharges into an overhead 14-in. screw conveyor which passes over the tops of the packing machine hoppers. This conveyor continues on over the four auxiliary storage tanks and is the same one that distributes incoming cement into those bins.

Motorized double-rotary valves are the means of keeping the packing machine hoppers filled with aerated, free-flowing cement, excess cement carrying on for discharge back into the tank from which it was drawn. The supply bins have low and high level indicators and have inlets below for air agitation. Spillage at the packing machines is picked up by the lower screw conveyor. There are three No. 360 Sly bag-type dust collectors to vent the system as shown on the schematic drawing; the cement dust in each case being returned into the circuit. The arrangement for masonry cement is the same except that there is one supply bin, a single packer and one dust collector.

Each packing machine has a capacity of 250 bbl. per hr., and the filled bags are handled from the machines by Link-Belt wire mesh horizontal conveyors. Hand trucks are the means of transfer into box cars. A 395-bbl. bulk cement car is loaded out on the platform scale in 30-40 minutes and, direct from silos through flexible hose, in 30 minutes. Approximately 60 percent of shipments is of bulk cement.

Bag storage is on the second floor of the packhouse, and there are five dumb-waiters in the building for handling bags and other materials. Bags are received by rail in pallet packages, 2000 to a package, and are handled from the cars and in storage by a Clark fork lift truck. Pallets are of wood and are expendible. The packhouse is operated six 8-hr. days per week.

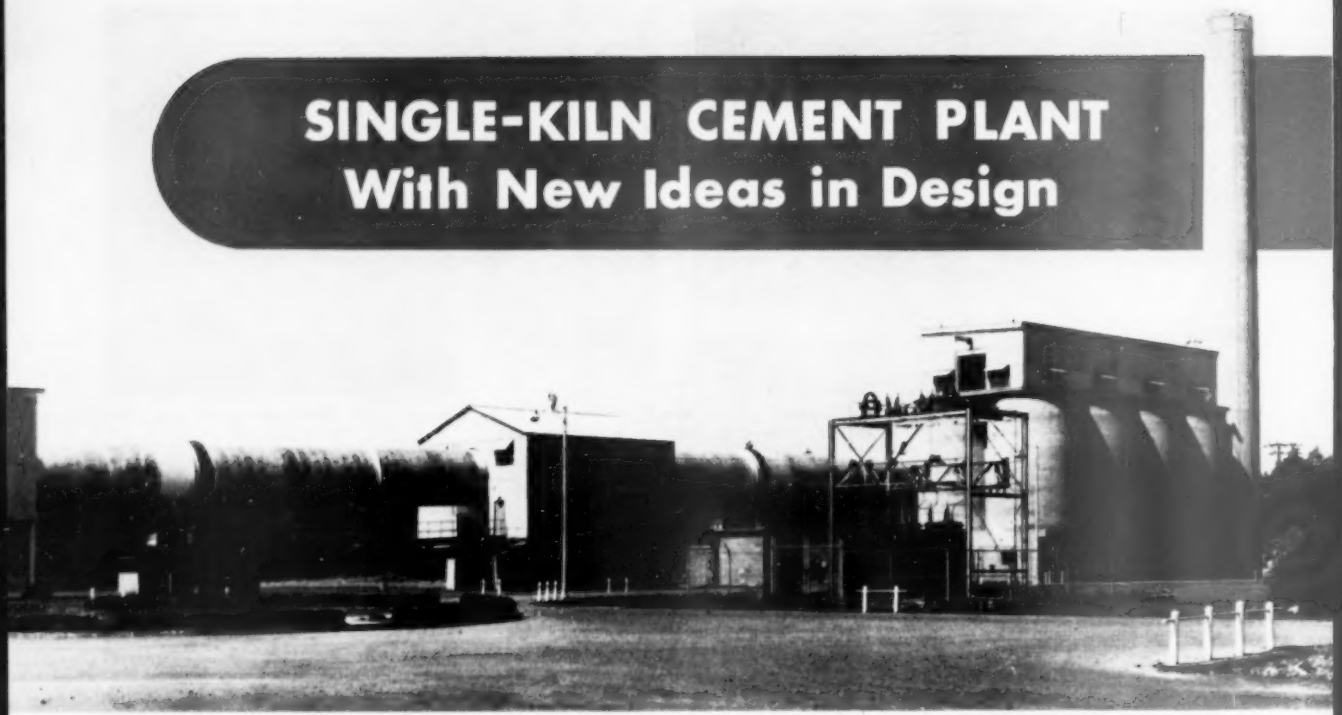
Electrical

Power for the plant is purchased from the Florida Power and Light Co. and is brought in at 66,000 volts to a main transformer station, rated at 7500 kva, where it is stepped down to 4160 volts and delivered over two incoming lines into a large central power distribution and electrical control room. This central room parallels the mill building and is maintained under slight pressure by air filtered through American air filters.

The power distribution system is one of the finest and most comprehensive seen in any cement mill. Motors in the plant proper comprise seven 700-hp. synchronous motors for the grinding mills alone and, in addition, there are some 150 general pur-

(Continued on page 202)

SINGLE-KILN CEMENT PLANT With New Ideas in Design



View toward feed end of kiln. Note that slurry tanks are elevated. Immediately below is control laboratory; also full-height room for slurry pumps, compressors, valves and piping. Working area is paved and flower beds have been planted

ALPHA PORTLAND CEMENT CO'S. new wet process plant at Jamesville, N.Y., is one of very few mills of less than one million barrels annual capacity to be built in this country for many years. Because of its relatively modest size, it is of interest to compare its economics with the bigger new plants which average near 1,500,000 bbl. annual capacity, and to point out design features favorable to cost control.

A direct comparison of invested capital per unit of employment, and of labor utilization per unit of production cannot be made because the plant has no quarry, and because certain mill buildings and departments were retained from the old plant which it replaces, but a favorable comparison is still indicated.

The plant was designed for a maximum production of 2200 bbl. daily (it is averaging more near 2400 bbl.) and employs 70 workers. Thus, the investment per man employed compares favorably with the average for the industry. The plant is producing cement with a power requirement of 23 kw. h. per barrel of output which is also favorable, when consideration is given to the fact that a large percentage of current production is to meet the extremely rigid specifications of the New York State Highway Department. The clinker autoclave soundness test in that specification requires harder than ordinary burning which results in a clinker that is highly abrasive and difficult to grind and which necessitates the use of large circulating loads which are power-consuming.

Stone is delivered into storage area in end-dump trucks

The effective use of equipment and manpower, which is obvious throughout the plant, is traceable to a compact basic layout which embodies utmost simplicity, with emphasis on low cost material handling, the use of labor-saving equipment wherever practicable to conserve the energy of men, and with a view to efficient conduct of maintenance and repair work.

This is a one-kiln plant and the basic layout might be described as a "T" design. An 11- x 375-ft. rotary kiln comprises the upright of the T and a long, covered storage area with overhead traveling crane is the cross member.

The kiln is fired with coal and discharges clinker over an air-quenching clinker cooler, the clinker dropping into a clinker pit in the covered storage area. Raw materials are proportioned and ground through a single compartment mill and the slurry is pumped into tanks at the back end of the kiln, for blending and feed by ferris wheel into the kiln. Kiln gases are exhausted through a Multiclone collector to a stack, and the dust is returned into the kiln feed stream. Cement is ground through a single compartment mill identical to the raw mill, which is in closed circuit with

Alpha Portland Cement Co.'s new wet process mill at Jamesville, N.Y., is one of the most attractive in the industry. Compact layout stresses cost control through effective use of machinery and manpower

By BROR NORDBERG

Above: Aerial view of plant taken from storage building side. Part of old dry process plant is visible on the extreme right

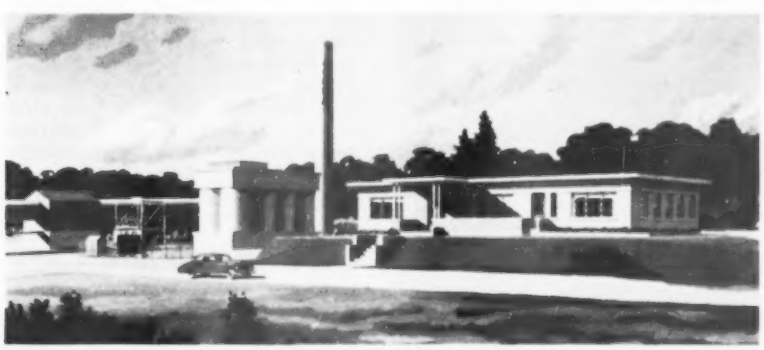
Left: Looking toward firing end of kiln; shows how water lines and electric conduit are above ground for accessibility

a mechanical air separator. The finished product is pumped into storage.

Raw materials used are a purchased limestone, shale from a new quarry opened by the company, iron ore, which is shipped in by rail, and sand which is delivered from local sources by truck. The plant is producing Type I, IA, II and IIA cements presently, Type IIA being special tested cement for the New York State Highway Department. However, the design has provided for the manufacture of high early strength and mortar cements.

Design Features

The arrangement of storage compartments and feed bins in the crane storage building is somewhat different from practices in other new plants using large covered storage areas. Concrete bins which serve as mill feed hoppers for the separate raw materials are arranged in a single row transverse to the long axis of the building as shown in the illustrations. This row of bins is in line with the axis of the single raw grinding mill in the adjoining mill building so that one long feeder conveyor can deliver proportioned materials to the mill, there being individual proportioning feeders delivering the separate materials from each overhead bin on to this conveyor. A similar arrangement handles clinker and gypsum to the finish grinding mill, which parallels the raw mill in a single mill building.

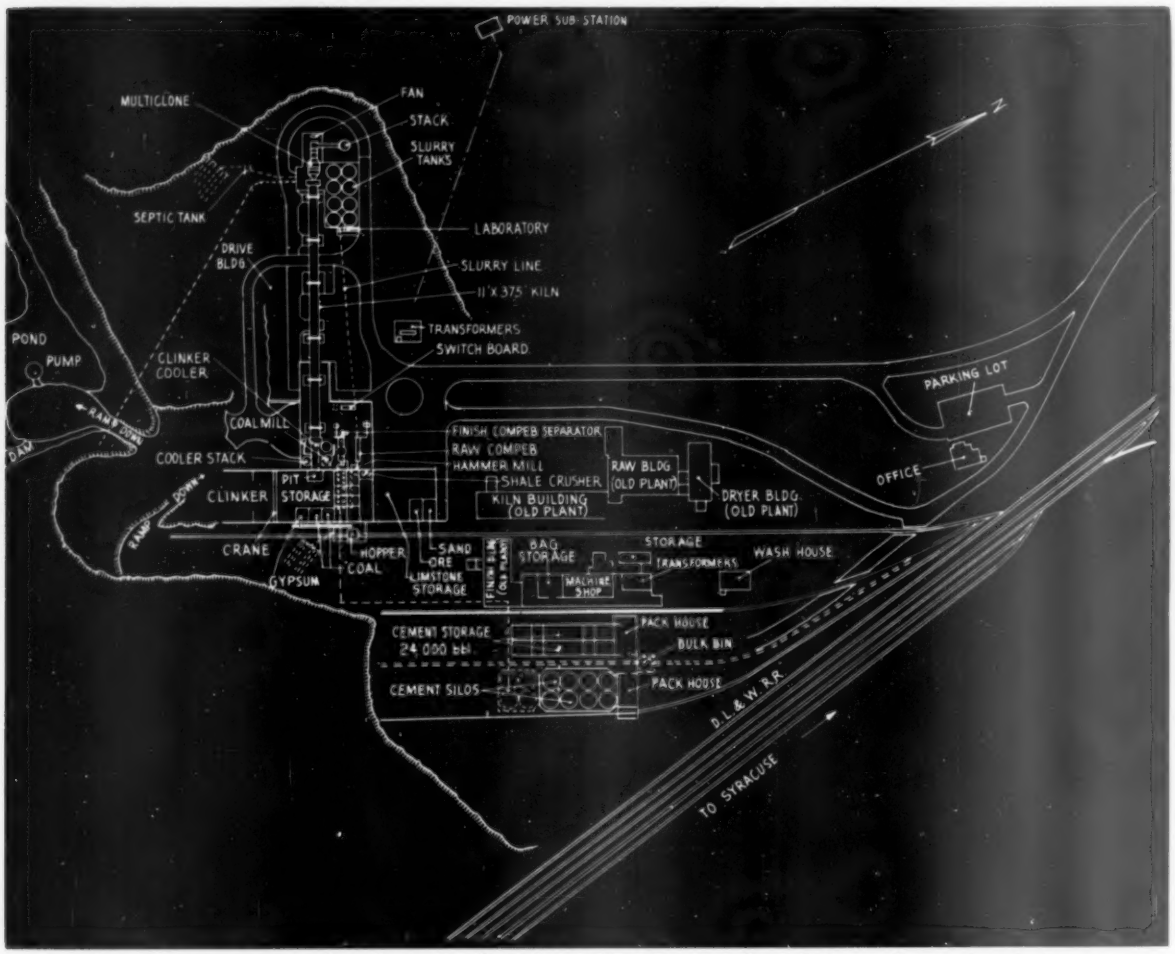


Architect's concept of new office building to be built. Kiln and slurry tanks are shown at the left

The kiln is housed at its feed end, at the drive and at the firing end, the latter being an extension of the mill building. Thus, all grinding equipment including the coal mill are housed in one building with the firing end of the kiln. Beneath the feed conveyor floor is a full-height storage area for repair parts and supplies which has a concrete floor that extends out under the grinding mill area. Parts and supplies delivered by rail are lowered into the storage area by a 7500-lb. capacity hydraulic elevator. Grinding mills are mounted on a level above grade which provides clearance below so that trucks, front end loaders and other equipment may be driven into the building at ground level for the delivery of grinding media, kiln brick, repair parts, and other supplies. Thus, fullest advantage is taken of powered equipment.

Re-handling of parts and supplies from the storage area and from the area below the mills is also accomplished by powered equipment. Kiln brick are stacked on wood pallets and handled by fork lift truck for transfer on to the lower end of an 18-in. inclined belt conveyor for delivery up to the kiln firing floor. This conveyor is of the tilting type. It is lowered only when it is to be used; otherwise, it is raised out of the way by a winch.

Grinding media are measured into buckets which are raised to man-hole



Layout of new wet process plant, showing its relationship to old, dry process plant which is no longer in production

height by lift trucks, and then swung over the mill man-holes by overhead chain hoists for discharge into the mills.

Design of the structures at the feed end of the kiln is also unusual. The slurry silos are elevated to provide a room below with a 12-ft. ceiling. There is a division wall so that half of this area is occupied by a new control laboratory, and the other half by the slurry pumps for blending and kiln feed, compressors, and overhead valves and piping. This makes it simple for the chemists to manipulate the valves necessary to the blending and flow of slurry.

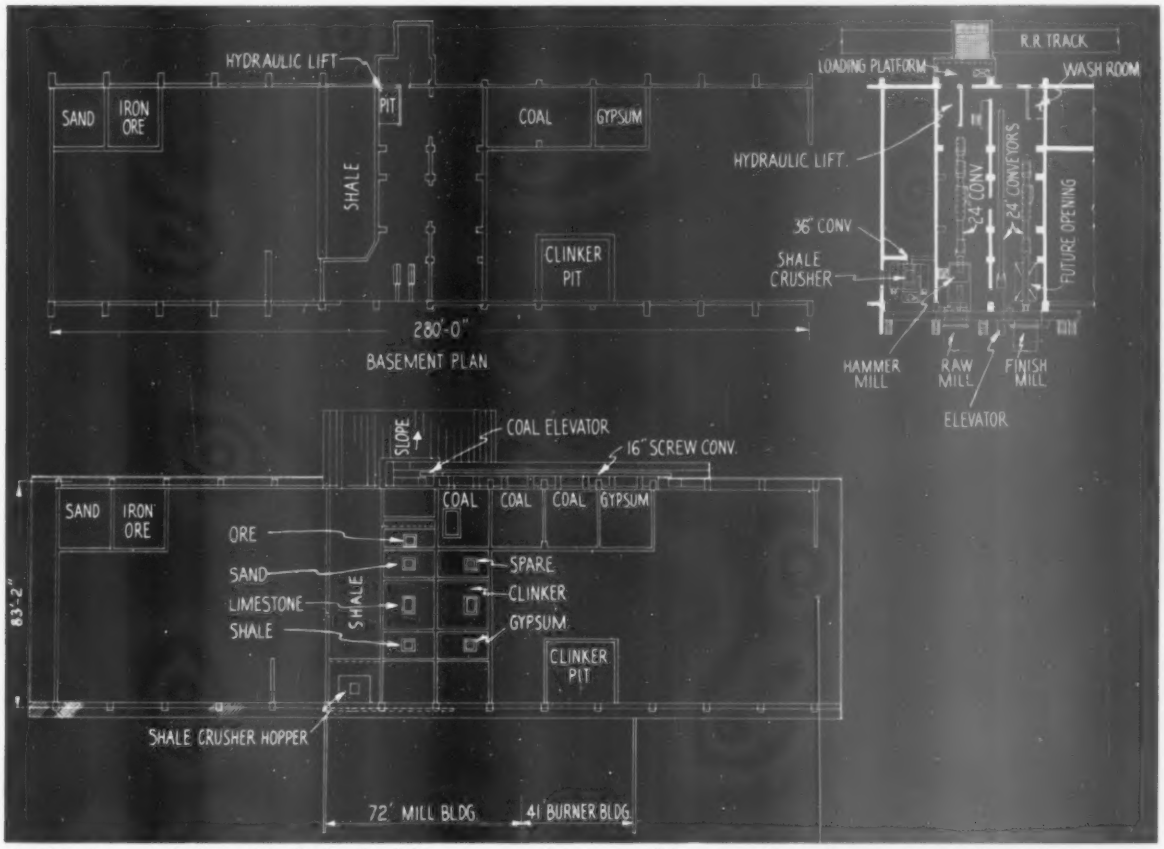
Overhead, the top floor of the slurry tanks is part of the kiln feed building. This arrangement, and also that at the firing end of the kiln, which is housed with the grinding mills, permits taking advantage of the heat radiating from the kiln shell for room heating purposes. Overhead ventilators in the mill room are provided for use when the weather is hot, and an oil heater is available for supplemental heat in the winter, should the kiln be down and it be necessary to protect against freezing of the materials in the mill feed bins.

The reinforced concrete kiln supporting piers are of arched construction and the spaces under each are used for storage, repair shops and other purposes. All water lines and electric conduit are above ground for accessibility, the only exception being the slurry line from the raw mill to the slurry tanks.

Buildings are of reinforced concrete and steel load-bearing construction throughout, with Transite asbestos-cement siding for the side-walls and with precast concrete roofing over the storage building. The plant is roomy throughout with generous clearances around all equipment which contributes to efficiency in performing maintenance, and to safe operation. All potential danger spots around moving equipment are adequately guarded as are the stairways and working levels.

A great deal of emphasis was placed on appearance of the plant, both inside and out, to make it attractive to the local public and for the men who work in it. The entire working area including coal storage has been paved and the principal roadways are of reinforced concrete construction. It was desired to landscape the plant, which required that some 10,000 cu. yd. of topsoil be placed to cover nonfertile glacial land, and the hiring of the services of a professional landscaping firm. More than 1500 specimens of 30 varieties of evergreen and deciduous trees and shrubs as well as flower beds, were planted to provide year-round color. The attractive surroundings have created more than passing interest on the part of the traveling public, local people, and the workers. It is an example of sound public relations, stemming from a desire to establish good employe relations through providing attractive working conditions.

The plant is flood-lighted for night operations and has a drainage system to permit washing down working areas in the buildings. It has adequate dust collectors in all areas of dust origin and electric water coolers at needed locations. Wash rooms and toilets are provided at several loca-



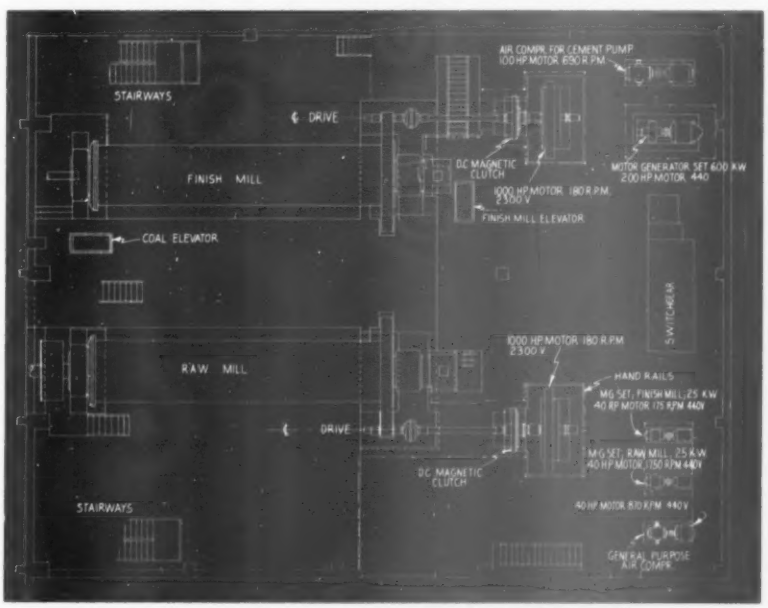
Feed bins for raw grinding and for finish mill grinding are arranged in two parallel rows at right angles to main axis of covered storage area. At upper right is shown proportioning and conveying arrangement below the feed bins

tions and there is a central locker and shower room.

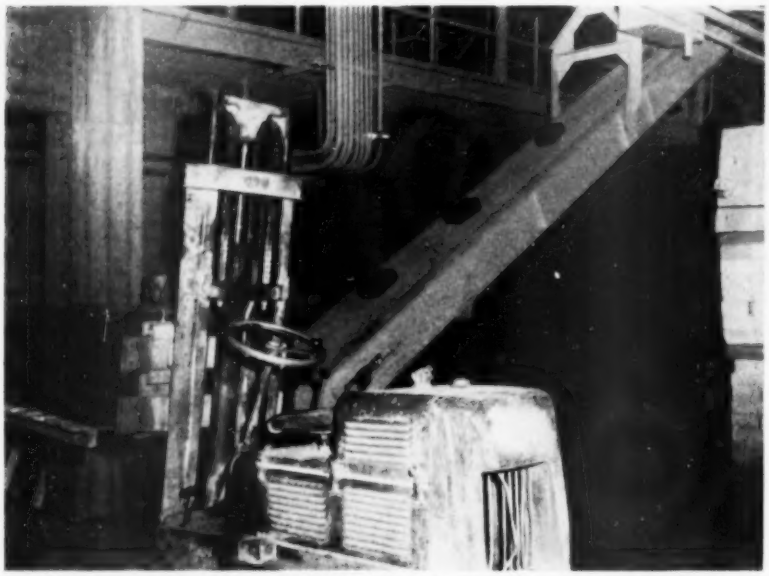
This new wet process plant is the smallest producing unit of Alpha Portland Cement Co. but its rated capacity has been increased to 2200 bbl. per day as compared to 1200 bbl. for the old dry process plant. That plant had operated at Jamesville until the new plant was placed in production late in 1952. Capacity was increased to meet increased demands, particularly for highway construction. A limiting factor in establishing capacity was the availability of limestone, which is purchased from the nearby plant of the Solvay Process Co. Div., Allied Chemical and Dye Corp.

The original dry process plant built in 1911 and purchased by Alpha in 1917 was set up on the basis of using screenings from the Solvay quarry and that practice has continued. It had two 8- x 120-ft. kilns, one of which was equipped with a Vanderwerp cooler. The present basic design lends itself well to further expansion, should that prove to be desirable and if limestone can be secured in sufficient quantity.

One of the main reasons for conversion to wet process was that limestone is wet screened for a period of nine months each year in the Solvay plant and it was desired to eliminate the drying of the stone and shale prior to grinding. Truck haulage was substituted for rail, in the handling of both stone and shale, to eliminate the problem of freezing in cars and the labor in unloading the cars. An important difference, in comparing



Plan view in mill building showing identical raw and finish mills



Kiln brick are handled on pallets by fork lift truck, and are carried up to kiln firing floor by an 18-in. inclined belt conveyor. Conveyor is lowered only for use

the new plant with the old one, is that the new plant has been equipped to meet with consistency the New York State Highway specifications for Type IIA cement. The old plant did not have the necessary facilities for pre-heating combustion air or the instruments to aid in maintaining uniform combustion in the kilns, with the result that specifications requiring hard-burning of clinker, as measured by the clinker autoclave soundness test, could not be met with regularity. Furthermore, it was a high-cost plant from every standpoint.

Raw Materials

Limestone comprises about 85 percent, by weight, of the raw mix, and shale about 15 percent. For Type II and New York Highway specifications about 2½ percent silica sand and from 1 to 1½ percent iron ore are substituted for an equal amount of limestone and shale.

Limestone averages some 92 percent $CaCO_3$ and is a washed product except for the winter months. Sizes vary according to excesses at the Solvay screening plant but the top size usually does not exceed about 2 in. The stone is hauled a distance of one mile in 20-ton end-dump trucks which discharge into a pit in the covered storage building.

The haul for shale was reduced from 7 miles (rail) to 3½ miles by opening a new shale quarry, and delivery to the plant is in 20-ton, end-dump trucks. Shale is also dumped into a pit in the covered storage building. The shale quarry is being worked on a 60-ft. face, using wagon drills and a ¾-cu. yd. P & H diesel-powered shovel for loading trucks. Practice is to operate the quarry intermittently and to keep the mill supplied with large reserves. Silica sand and iron ore are unloaded from railroad cars directly into storage by a Barber-Greene unloader.

Kiln brick are stored on pallets in basement storage for handling by fork lift truck

Storage

All materials are stored in the single storage building, which measures 280 ft. in length and has a span of 80 ft. Transfer of the separate materials from receiving hoppers into storage compartments, and all handling in storage, are done by an 8½-ton P & H electric overhead traveling crane with 3-cu. yd. Blaw-Knox clamshell bucket.

Storage capacity under cover is as follows:

Material	Storage	Feed bin capacity
Limestone	4300 tons	200
Quarry-run shale	1200 tons	100
Crushed shale	1200 tons	100
Gypsum	600 tons	100
Coal	900 tons	100
Iron ore	500 tons	150
Sand	400 tons	100

Clinker storage capacity will be 45,000 bbl. after completion of a 35-ft. extension to the building now under way.

All of the elevated feed bins are of reinforced concrete construction with a row of bins, for raw grinding, paralleling a second row of bins serving the finish mill—both rows perpendicular to the axis of the building. Four bins in one row are for limestone, crushed shale, iron ore and sand. The second row comprises bins for clinker, gypsum, and limestone to be used for mortar cement manufacture. A separate feed bin is for coal and there are two reserve bins for coal and gypsum. There is an additional feed bin for the shale to be crushed. Limestone is stored at one end of the building while the clinker storage and the clinker discharge pit are at the other end.

A rail siding parallels the storage building for delivery of gypsum, coal and iron ore. Also, there is an un-

View in crane storage building, showing raw material feed bins and those for finish mill in two parallel rows crosswise to main storage building

loading platform for the handling of repair parts into the elevator for delivery into storage below. Gypsum and coal, as received by rail and discharged into a track hopper are placed directly in overhead bins by bucket elevator and screw conveyor.

Uncrushed shale is re-handled by the overhead traveling crane into a concrete hopper over a Pennsylvania "Armorweld" 24- x 40-in. single roll crusher driven at 35 r.p.m. by a 75-hp. motor, for reduction to minus 2 in. at a rate of 50 t.p.h. Product of the crusher is conveyed into the crushed shale storage compartment alongside the row of raw mill feed bins by a 36-in. x 10-ft. Carrier oscillating conveyor.

This type of conveyor is comparatively new to the portland cement industry and is termed a "natural frequency oscillating conveyor" by the Carrier Conveyor Corp. It consists of a horizontal steel trough supported by coil springs and is designed to operate at the natural frequency of the springs, the theory being that the only power required is that sufficient to convey the materials; that the conveying energy is stored up in the springs and is returned on every stroke similar to the action of a flywheel.

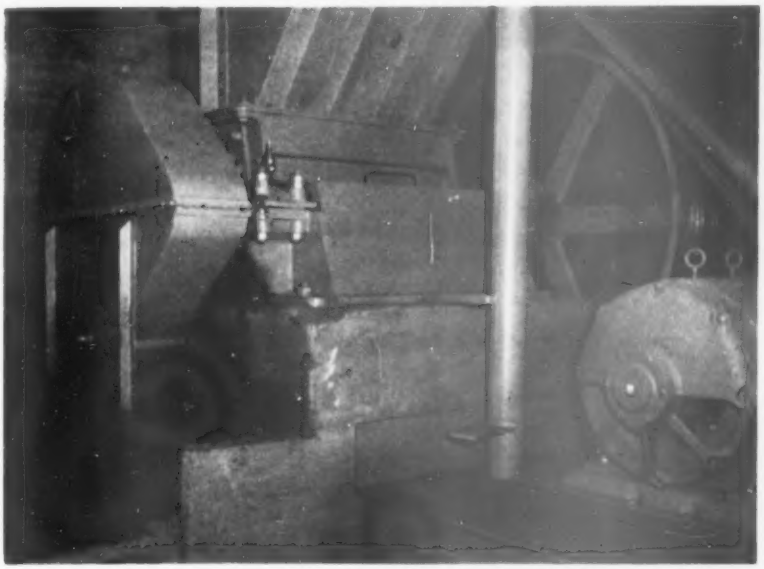
Four of these conveyors are in use, the other three being to transfer coal from the feed bin into the kiln firing room, to deliver proportioned raw materials to a hammermill ahead of the raw mill and to deliver proportioned clinker and gypsum to the finish mill. Their selection for these applications was based on low power requirement, their drives being 2- and 3-hp. motors, anticipated low maintenance and on their compactness.

Raw Grinding

Proportioned raw materials are delivered by a 24-in. x 51-ft. oscillating conveyor to a hammermill for reduction to minus ⅜ in. size preliminary to feed into the raw mill. Limestone is fed on the conveyor by a 30-in. Link-Belt reciprocating feeder, with P.I.V. drive, and individual Hardinge constant weight feeders with Reeves adjustable speed drives to regulate the flow of shale, sand and iron ore on to the common conveyor. The feeders are manually adjusted for correct proportions.

The hammermill is a Hammermills, Inc., unit, driven by a 75-hp. motor, and is rated at 60 t.p.h. of minus ⅜-in. material. A pick-up elevator delivers the crushed, blended material into the raw mill feed spout, water being metered into the spout by an adjustable hand valve to hold the slurry to 36 percent water. No thickener is used.

Slurry is ground at the rate of 38 t.p.h. to a fineness of 90 percent minus a 200-mesh sieve, through an 8- x 40-ft., 3-compartment Compeb mill driven at 19.85 r.p.m. by a 1000-hp. synchronous motor through a Cutler-Hammer magnetic clutch. The mill charge consists of 51,000 lb. of 4-in. forged steel balls in the first compartment, 75,000 lb. of 1½-in. size in the second compartment, and 70,000 of ⅞-in. balls in the finishing compartment.



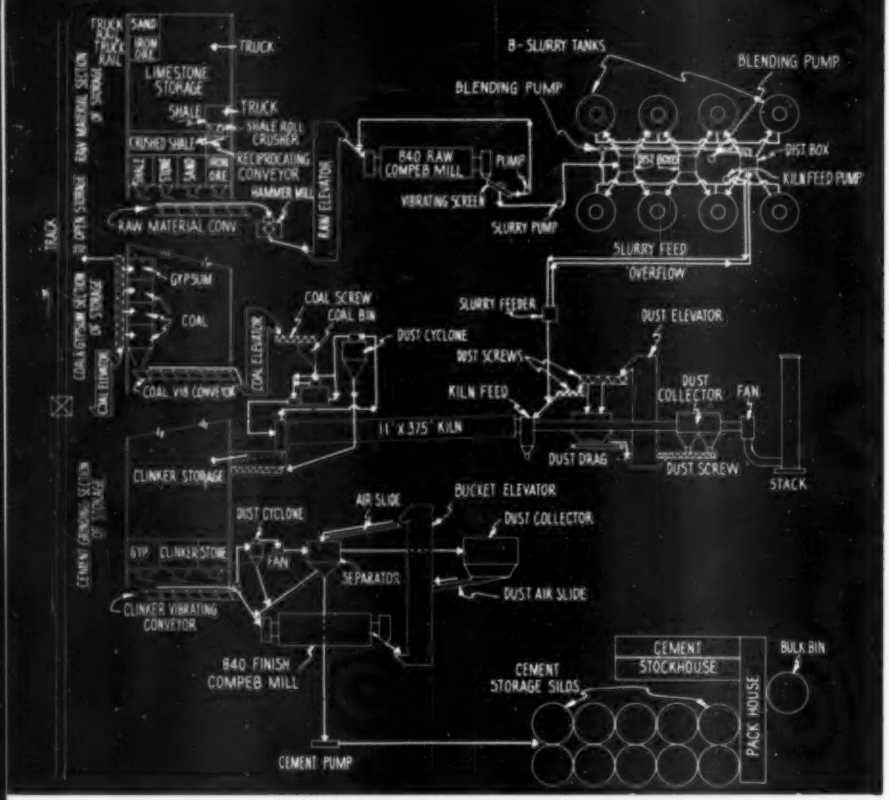
Shale is crushed to 2-in. top size through this single roll crusher and then returned to storage for re-handling to raw mill feed bin. Note substantial safety guards

Raw grinding is in open circuit except that a small amount of oversize particles coming through the mill is returned into the mill feed spout. These are the pieces in the size range of ¼ to ⅜ in. which could cause plug-ups in slurry lines if permitted to pass. These "spitzers" are intercepted by putting the mill discharge stream over a 4- x 5-ft. single-deck Hum-mer screen which rejects plus ¼-in. material into a pump feed hopper. Here, water is added and a slurry pump returns this oversize through a 1-in. line into the mill feed spout. Slurry is pumped by a 3-in. slurry pump through a 500-ft. line to the slurry tanks near the feed end of the kiln.

Blending

The system for blending was designed for maximum flexibility, using eight separate slurry tanks each of relatively small capacity rather than larger units, to permit accuracy in blending and to facilitate rapid changing over from the manufacture of one type of portland cement to another. There are eight reinforced concrete tanks, each measuring 20 ft. in diameter by 31 ft. in height, arranged in

Individual proportioning feeders regulate the flow of separate materials on to a common oscillating conveyor



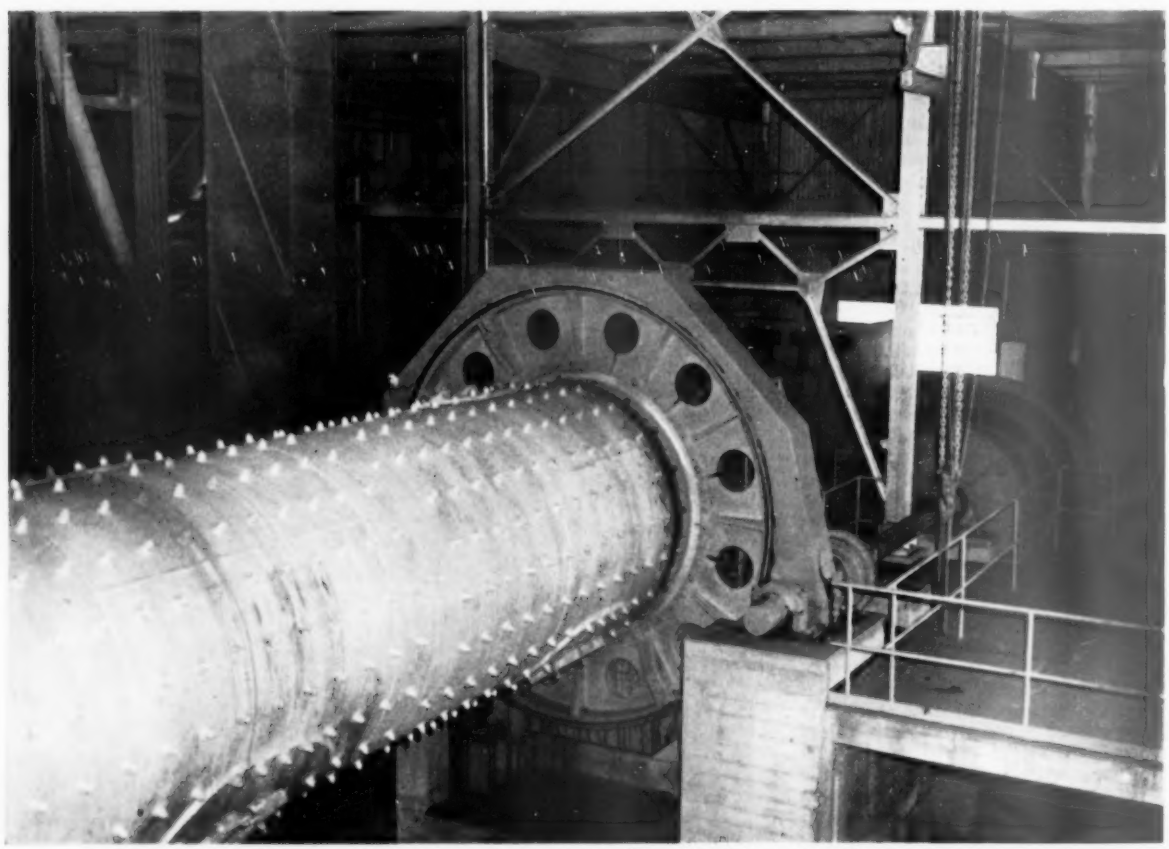
Schematic drawing of the entire new wet process plant

two rows of four. Working capacity of each is 873 bbl. of clinker equivalent, which provides a reserve for about three days of kiln operation. It requires approximately three hours of raw mill operation to fill a tank.

Overhead, there are three distributing boxes. One serves the four tanks nearest the raw mill, and a second is the means of transfer into either of the other four tanks which are for corrected slurry to be drawn from for kiln feed. The third distributing box, not normally in service, would permit delivery of slurry from the mill into two of the kiln feed tanks should that ever be desirable or become necessary.

Practice is to deliver slurry from the raw mill into either of the four receiving tanks and to draw from each pair of these tanks, required amounts by volume into either of the other two pairs of four tanks. There are two 3-in. slurry pumps provided for blending, and a third 3-in. pump delivers corrected slurry from a pair of kiln feed tanks simultaneously, to a 54-in. 12-bucket ferris-wheel feeder over the kiln. Overflow from the feeder flows back to the distributing box for return into the tanks from which it was drawn.

Each tank has a Dorr slurry mixer supplied air from a Fuller C-110 rotary air compressor rated to deliver



View of single raw mill showing discharge end and drive. Finish mill is on left. Mills are elevated so trucks may drive in below

519 c.f.m. at 40 p.s.i. When a tank is filled it is tested for lime content and it is tested again after a period of blowing with air.

As already stated, the slurry tanks are elevated so that the slurry pumps, compressor and valves are in a full story height room underneath and adjoining the laboratory for convenient checking and change-over by the plant chemists.

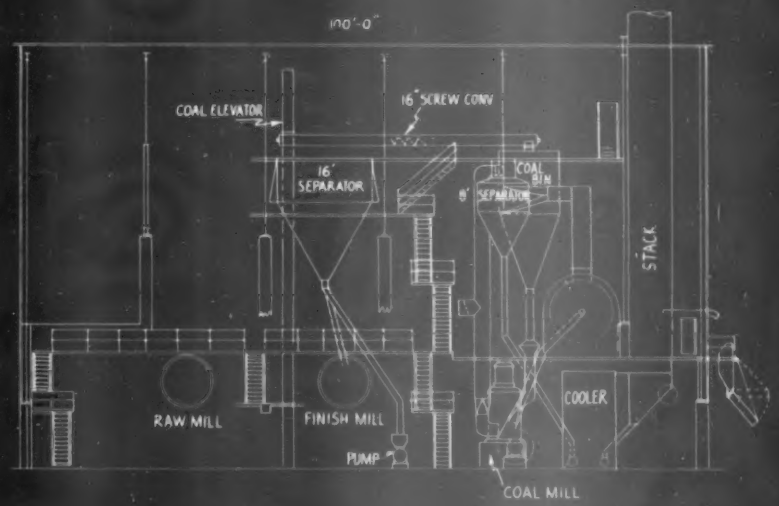
The human element in keeping a check on the depth of slurry in any of the tanks has been eliminated by automatic instrument measurement of slurry depth. On the laboratory wall there are eight Foxboro liquid level instruments which continuously record, for each tank, the depth of slurry. This is a function of time so progress in filling and drawout is shown graphically. The recording mechanism in each case is actuated by a diaphragm near the bottom of the tank which is sensitive to variations in the column of slurry over a range of 0 to 40 ft. These records are a continuous check on the quantity of slurry in each tank.

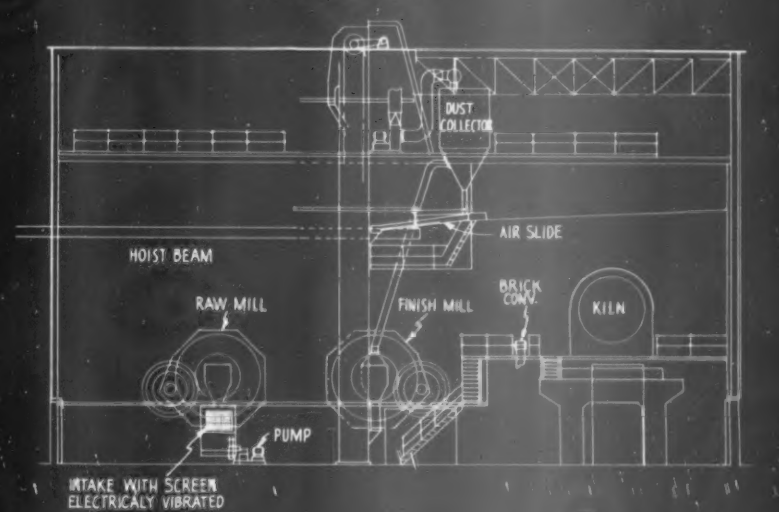
Kiln

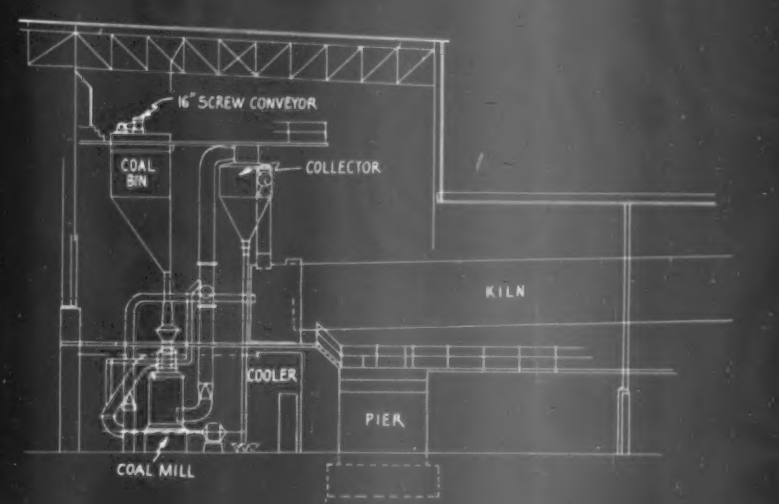
The kiln is of $\frac{3}{4}$-in. plate welded construction, measures 11 x 375 ft. and is of Allis-Chalmers manufacture. It is carried by six tires riding on six sets of rollers and is sloped at $\frac{3}{8}$ in. to the lineal foot. It has the Allis-Chalmers balanced dual drive consisting of two 75/100-hp., 400-1200 r.p.m., adjustable speed 230-volt motors each connected by Texrope to a Falk herringbone gear reducer. The motors are held in balance by rheostat controls on the kiln instrument panel. This drive prevents walking of the kiln and there is no evidence of vibration or shock as the kiln turns. An auxiliary gasoline engine is available to turn the kiln in the event of power failure or other shut-down.

The kiln is lined with 6-in. refractory brick for its entire length. For the first 9 ft. from the hood, the lining is of 70 percent alumina brick followed by 33 ft. of basic brick in the hot zone. The balance back to the chain section is of alumina brick followed by a poured concrete abrasion-resisting lining through the chain section. A series of chains is hung in loops from the kiln shell, starting 17 ft. from the back end and extending for a distance of 55 ft. The kiln is painted with heat-resistant aluminum paint for its entire length which makes for attractive appearance.

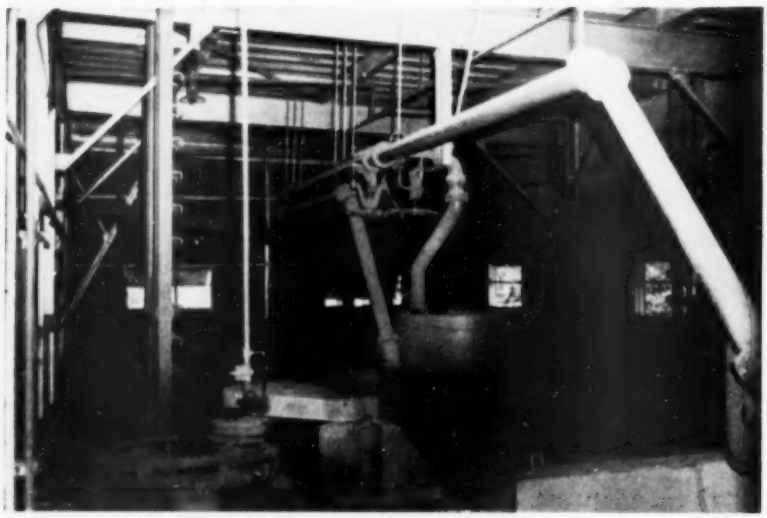
Clinker is discharged over a 6- x 33-ft. Fuller inclined-grate air-quenching clinker cooler and is cooled to approximately 125 deg. F. upon discharge into the clinker pit in the crane storage area. Air for cooling through the clinker grate is supplied by a New York Blower Co. fan driven by a 50-hp. motor. Total volume of air







Vertical sections showing finish mill circuit, raw mill and direct-firing coal mill installation



Shown here are the three distributing boxes atop the slurry tanks. One serves the four tanks nearest the raw mill, and a second is for transfer into either of four tanks which are for corrected slurry

delivered is 35,500 c.f.m. (6-in. s.p.), at peak clinker capacity of which 14,240 c.f.m. is preheated for secondary air delivering into the kiln at a temperature of about 1230 deg. F. and the balance exhausted through a stack at about 250 deg. F.

Coal Firing—Stack Dust

Firing of the kiln is done by a No. 533A Raymond direct-firing unit coal mill driven by a 200-hp. squirrel cage motor. It is fed coal with a top size of 1½ in., which is ground to a fineness of 97 percent passing the 100-mesh sieve. The mill is rated at 14,500 lb./hr. ground to 85 percent minus 200 mesh with a feed at 50 grindability.

Coal crushed to size is received by rail at the plant and is discharged into a track hopper from which a reciprocating feeder and bucket elevator, with overhead 16-in. screw conveyor, are the means of transfer into three 100-ton overhead bins within the covered storage area. Coal is withdrawn by an 18-in. by 63-ft. oscillating conveyor which carries it to a bucket elevator from which a 16-in. screw conveyor fills a 100-ton coal mill feed bin. This bin has high and low bin-dicators which flash red lights on the burner floor and sound a siren if the bin is approaching full or empty. The operator then shuts off the conveying system or starts it up. There is a Bailey counter in the coal feed pipe interlocked with an electric demand meter which is on the kiln control panel, to record the flow of coal in lb. per hr. This is a means of keeping an accurate record of coal consumption and a mechanism for smoothing out variations in the rate of coal feed.

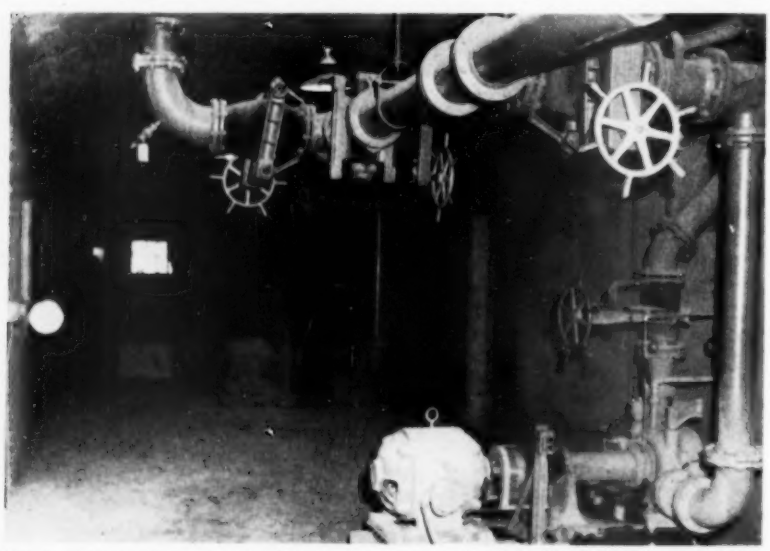
Preheated air for drying the coal in the mill is drawn from the kiln hood at the rate of 600 c.f.m. according to standard practice, is put through a cyclone to trap clinker dust and enters the mill at a temperature of 400 deg. F. —500 deg. F. for average moisture conditions. Temperature of the primary air-coal mixture entering the kiln hood through a 12-in. water-cooled burner pipe is held at 180 deg. F. through pneumatic manipulation of the cold air damper in the heated air pipe. This may be done manually or automatically.

The kiln gases are drawn through a Western Precipitation Corp. Type 24VD Multiclone cyclone-type dust collector and are exhausted by a Robinson 84-in., 4-blade induced draft fan through a 10- x 150-ft. lined concrete stack. The dust collector and fan are rated 125,000 c.f.m. at 500 deg. F. The fan is driven at 649 r.p.m. by a 250-hp. motor through V-belt. The stack was constructed by Rust Engineering Co.

All of the dust is presently being returned into the kiln, intermixed with the slurry. Dust from the collector is conveyed by a 12-in. screw conveyor to an enclosed bucket elevator, 56-ft. centers, for transfer to an overhead 12-in. horizontal screw conveyor above a 40-ton dust bin.

A transverse 4-in. screw conveyor is tapped into the housing of the 12-in. conveyor to deliver dust from the circulating stream into a vortex mixer where it is mixed with the slurry. The small screw conveyor has a variable speed drive to adjust the rate of dust return to the kiln.

Excess dust overflows into a bin from which a drag chain conveyor is the means of transfer back into the dust elevator. Provision was made so that dust could be drawn from this bin for disposal by truck.



Slurry pumps, compressors and valves are in a room with 12-ft. ceiling below slurry tanks for ready accessibility. Control laboratory is in a parallel, adjoining room below slurry tanks

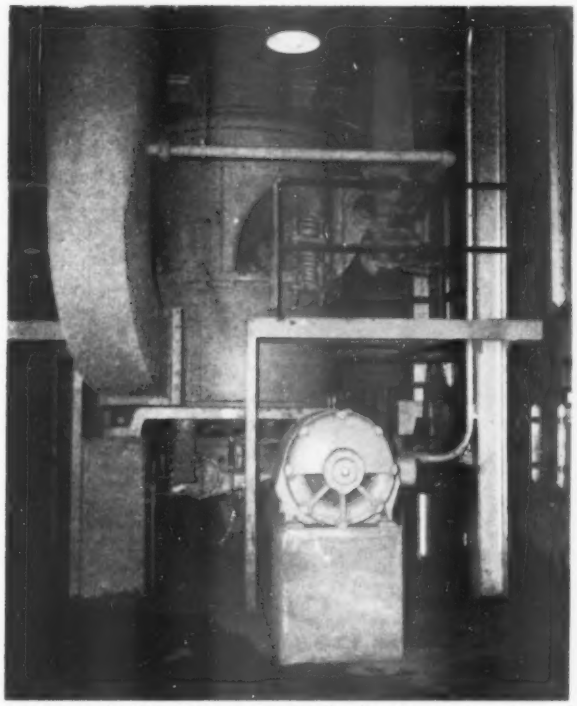
Instrumentation

All instruments concerned with the firing of the kiln are centralized on an Allis-Chalmers master kiln control panel on the burner floor. Many automatic firing features have been provided for, but until optimum holding points for all the variables that enter into long kiln operation have been determined and burners have become thoroughly accustomed with firing the kiln, manual controls are being largely used.

The master control panel, in addition to the kiln instruments, has all the instruments for the coal mill operation, the clinker cooler, slurry feeder, draft fan and dust handling equipment.

The following instruments were provided:

L & N Speedomax recording the



Left: Kiln is fired by this direct-firing coal mill which grinds coal to a fineness of 97 percent minus the 100-mesh sieve. Right: Counter in coal feed pipe to direct-firing coal mill is interlocked with an electric demand meter to record rate of flow of coal

hot zone temperature as measured on the kiln lining by optical pyrometer

L & N Speedomax recorder for kiln speed, the slurry feeder speed, exit gas temperature and for the gases upon entering and leaving the chain section

L & N Speedomax recording temperature of the slurry as dried, coming out of the chain section

Coal demand meter (lb. per hr.)

Hays 2-pen recorder for hood draft and back end draft

L & N firing hood draft indicator

L & N feed end draft controller

Damper position indicator

Brown 2-pen temperature recorder for coal mill

Hays 2-pen indicator for upper mill suction and lower exhauster outlet pressure (coal mill)

Ammeters (2) for d.c. kiln drive motors

Kiln revolution totalizer

Slurry feeder speed indicator

Kiln speed indicator

Two kiln motor balancing rheostats

Manual kiln speed control

Ammeters for exhaust fan motor and coal mill motor

Manual adjustment for regulating primary air to coal mill

Lights and buttons for exhaust fan motor, dust feeder motor, cooler drive motor, cooler fan motor, cooler dust screw motors (2)

Indicating lights and start-stop buttons for kiln motors, slurry feeder motor, coal mill feeder motor, coal mill motor, motor-generator set for kiln drive, kiln brake release

D.C. voltmeter and ammeter

Ammeter for generator drive

Clinker cooler automatic controls

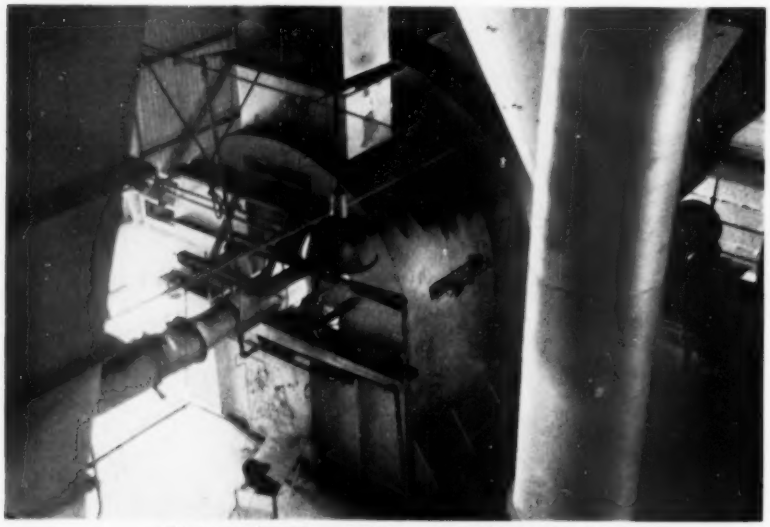
Feed regulator, primary air regulator, draft gauge, temperature recorder, mill motor starter, feeder motor starter and overload switch for coal mill

Kiln Operation-Performance

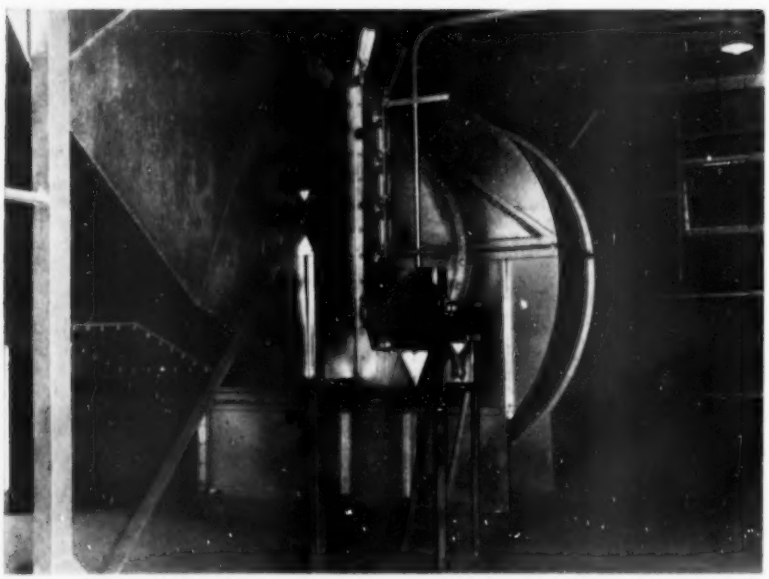
Most of the foregoing instruments are conventional in modern long kiln installations but there are two exceptions. One is the electric demand meter which records the use of coal in lb. per hr. The measure is made volumetrically through the counter which is located in a 12-in. square downspout from the coal feed bin to the bowl mill.

Also, it is of interest that there are separate thermocouples just below the chain section, for recording the temperature of the gases, and of the nodules as they come out of the chains. There is also a recording of

Liquid level instruments in laboratory show continuous record of depth of slurry in each of eight slurry tanks



Kiln is coal-fired through 12-in. water-cooled burner pipe



Induced draft fan for kiln. Louvre damper seen on suction side is hooked up for either manual or automatic draft control

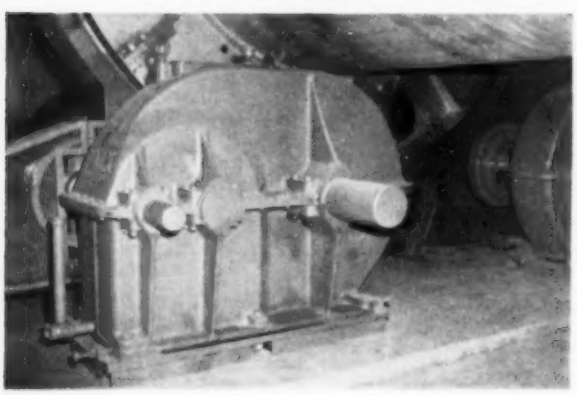
the temperature of the gases at the upper end of the chain section. Draft is adjusted to hold the nodule temperature at approximately 600 deg. F., when the gas temperature at the lower end of the chains is 1250-1350 deg. F. Should the nodule temperature fall below 600 deg. F., the slurry is considered too wet coming through the chains and the draft through the kiln is increased. The reverse holds, should the temperature go higher.

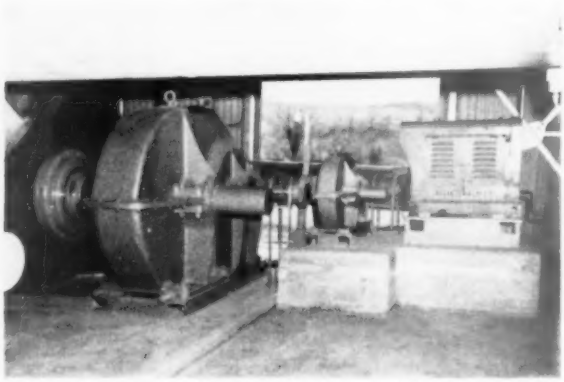
This control is important to the formation of sound nodules in order to minimize dust, for uniform flow through the kiln and a check against mud ring formation. When the kiln was first started up, there had been a tendency to build mud rings in the middle of the chain section.

In the early months of operation while seeking optimum firing conditions, many adjustments were made to the kiln speed, which has a range of 50 r.p.h. to 80 r.p.h., and manual adjustments continue to be made of the ferris wheel feeder speed. Practice then was to hold the firing rate constant. The kiln speed has now been stabilized at 60 r.p.h., the rate of feed is tied to kiln speed, and practice is to adjust the rate of firing and draft to hold uniform conditions in the kiln.

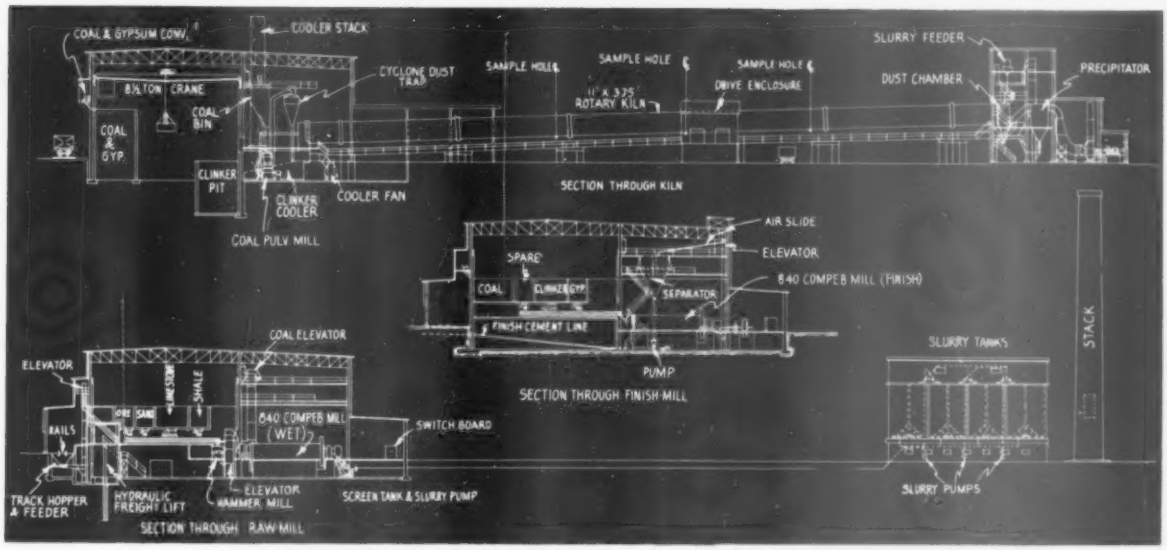
Firing is done with a short, intense flame and at an indicated hot zone temperature of 2700 deg. F. as measured by optical pyrometer focussed on the kiln lining. Draft through the kiln is held at approximately 1.5 in w.g., maintaining a slight suction at the kiln hood. Oxygen in the exhaust gases is held at about 2 percent as measured by portable gas analyzer. Temperature of the gases is approximately 800 deg. F. after drying the slurry in the chain section and 600-650 deg. F. at the draft fan. A louvre damper on the suction side of the fan may be manually adjusted at the burner floor to bleed in cooling air, should temperatures of the gases exceed a maximum limit of 750 deg. F. The louvre damper is hooked up for manual or automatic draft control.

The clinker cooler has both manual and automatic grate speed control





Left: Kiln is driven by balanced dual drive consisting of two motors, each with herringbone gear reducer. Right: Emergency kiln drive is a gasoline engine and gear reducer



Sectional elevations of kiln installation, raw mill, finish mill and slurry tanks

for regulation of the temperature of the secondary air for combustion. A bleed pipe out of the air duct of the cooler is the means of supplying air for cooling the kiln nose ring.

Production of the kiln is averaging 2400 bbl. per day with a fuel consumption averaging 100 lb. per bbl. A West Virginia high volatile coal of 12,500 B.t.u. per lb. heat value is used.

Finish Mill

The clinker cooler has no chunk breaker and the top size of clinker is about 2 in. as discharged directly into the clinker pit. Clinker is removed from the pit by the overhead crane into storage, and the crane rehandles clinker into the mill feed bin. Gypsum is similarly handled into a second bin, and the third bin, in the row over a common 24-in. x 50-ft. oscillating conveyor is for limestone to be used in the manufacture of mortar cement.

Proportioning is done by individual Hardinge constant-weight feeders on to the conveyor which discharges directly into the finish mill. In manufacturing Type IA cement, a liquid air-entraining agent is proportioned on the bed of material on the conveyor just ahead of the mill.

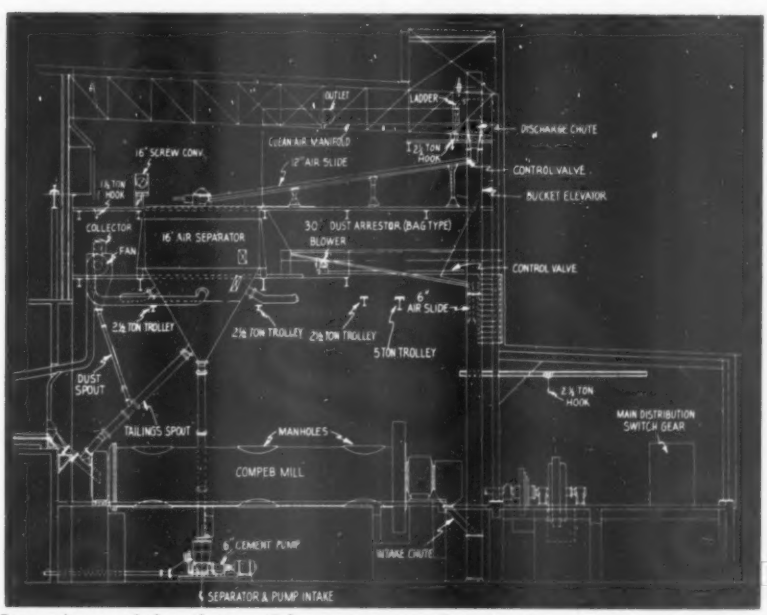
The mill is a three-compartment Compeb mill identical to the raw mill and carrying the same ball charge. It is driven at 18.7 r.p.m. and is operated in closed circuit with a 16-ft. Sturtevant mechanical air separator driven by a 75-hp. motor. The mill stream is elevated and the transfer into the separator made by a 12-in. F-H airslide.

Rejects are returned to the mill, and finished cement is spouted into the hopper of a 6-in. F-K type H pump for transport to storage. A 585 c.f.m. Fuller C-120 rotary compressor serves the pump.

The mill capacity is rated at 120 bbl. per hour in producing cement ground to 1750 surface area (Wagner). Circulating loads in producing New York State Highway cement are in excess of 300 percent.

Cooling air is drawn through the air separator, which is on the suction side of a 30-ft., 6-compartment Norblo automatic bag-type dust collector which ventilates the bucket elevator and the discharge end of the grinding mill. Dust is returned from the collector by an 8-in. Airslide into the enclosed bucket elevator. Dust is also drawn from points of origin on the oscillating conveyor to a cyclone dust collector which exhausts cleaned air into the mechanical air separator. The dust trapped is spouted into the reject spout from the air separator.

Temperature of the mill discharge stream is recorded on a Foxboro recording instrument and the finished cement temperature as measured coming out of the F-K pump is also recorded. The records indicate that the cement is cooled approximately 100 deg. F. in the separator circuit, from a range of 200 to 300 deg. F. down to a range of 120 to 190 deg. F.



Cement is ground through 8- x 40-ft. compartment mill in closed circuit with mechanical air separator as shown here in elevation

Storage-Packing

Cement storage comprises 24,400 bbl. in a rectangular stockhouse and 99,000 bbl. in eight reinforced concrete

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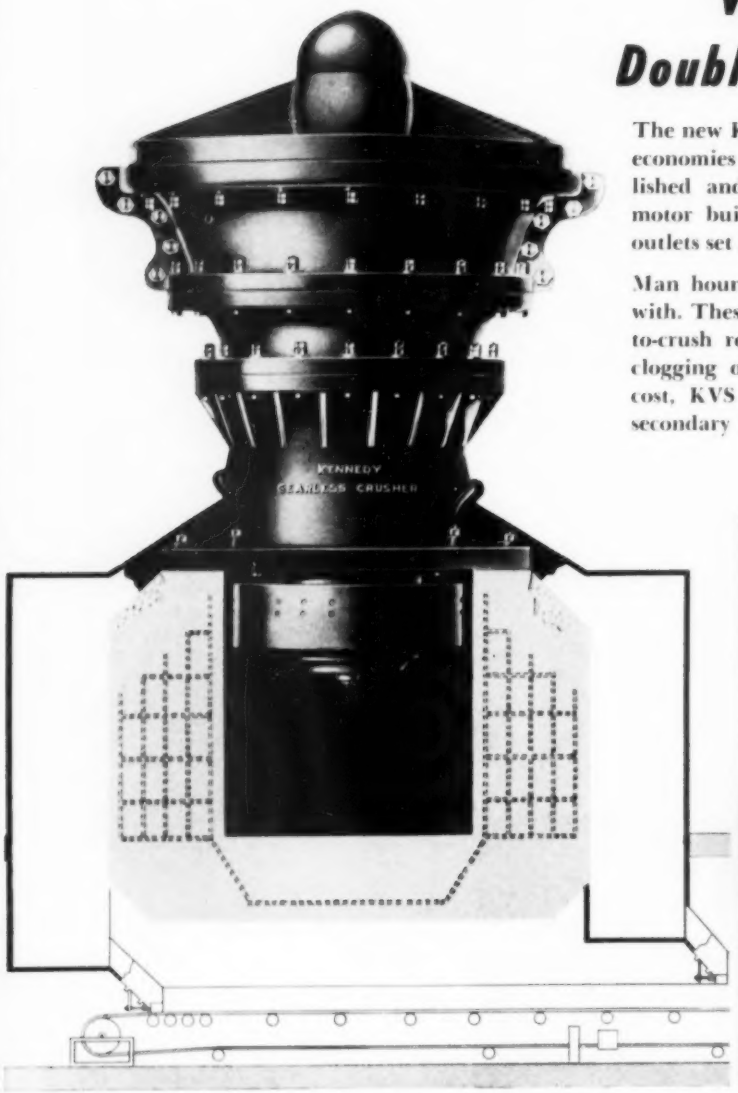
Double Discharge Crushers!



The new Kennedy double discharge crushers afford operating economies not found in any other type. In addition to established and rated power savings through the synchronized motor built directly into pulley assembly, TWO discharge outlets set at 70 degree angle eliminate the sticky ore problem.

Man hours, lost in clearing clogged crushers, is done away with. These new design crushers handle slag, tachonite, hard-to-crush rock and ore with *as much as 50% clay*, without clogging or stalling. For peak capacities at low operating cost, KVS crushers are unmatched! Built in primary and secondary types to suit every crushing requirement.

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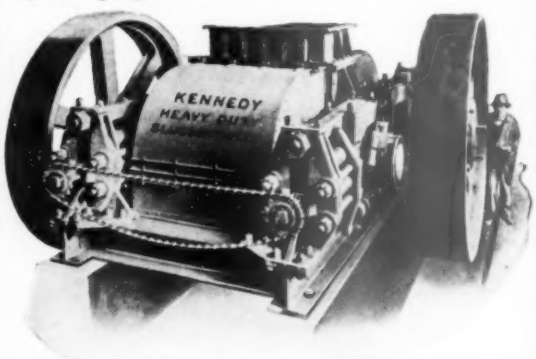

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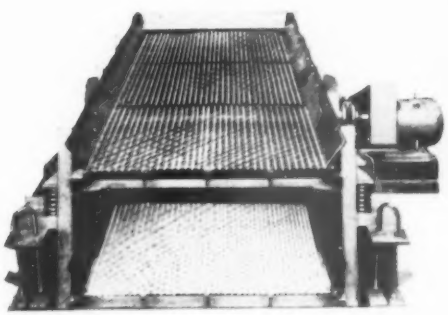

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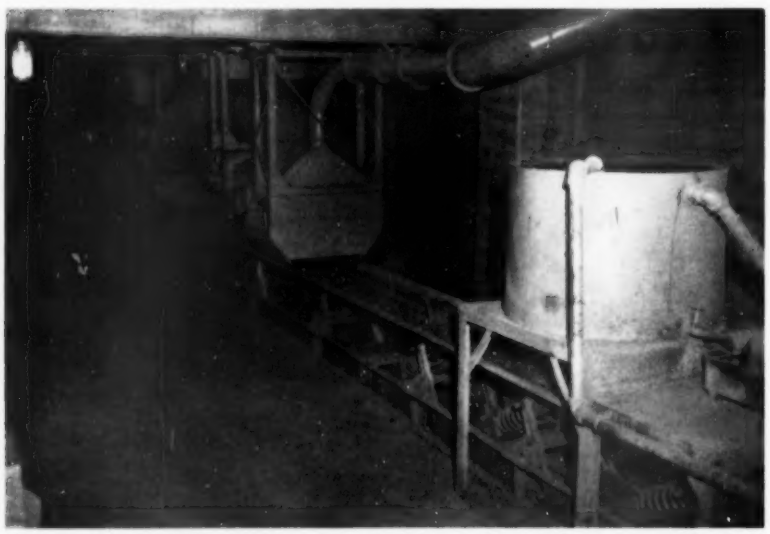
Clinker is cooled over this inclined grate, air-quenching clinker cooler



Clinker and gypsum feeders are shown proportioning materials to oscillating conveyor for direct delivery into finish mill. Tank on right is for proportioning liquid air-entraining agent on bed of material

silos with their interstices. Packing equipment consists of a 3-tube St. Regis packer for the stockhouse and two 4-tube units for the silos. This is a rail-shipping plant and about 60 percent of production is shipped in bulk. The plant is served by the Delaware, Lackawanna and Western railroad.

Four new cement storage silos are now under construction to provide for 44,000 bbl. additional storage. In addition, a 4-compartment concrete silo of 4800 bbl. capacity is under construction for bulk loading of railroad cars and trucks. It will have a 50-bbl. Blaw-Knox batcher and dial scales with ticker printer. Cement will be transferred into the bin compartments by bucket elevator and screw conveyor, and the building will be vented by a 1400-c.f.m. Sly bag-type dust collector.

Sampling-Laboratory

Laboratory personnel handle all the mechanics of slurry blending operations and have the necessary equipment for all conventional chemical and physical testing. Among routine and regular tests are the following:

The raw mill product is sampled and tested every two hours for fineness and lime content.

The finish mill stream to the F-K pump has a continuous automatic sampler and the sample is tested every two hours for fineness.

The coal mill product is tested once a day for fineness, volatiles and ash content.

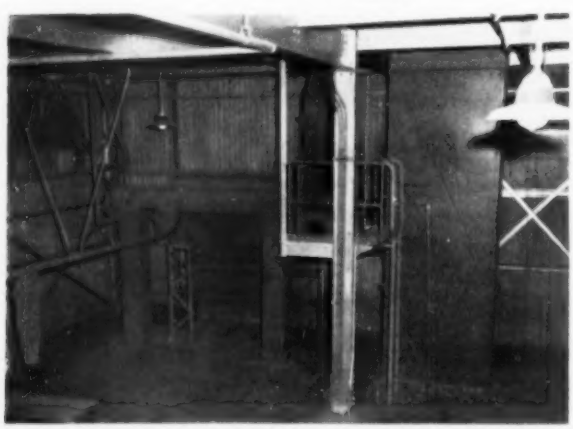
A sample from each slurry tank, when filled, is tested for lime content.

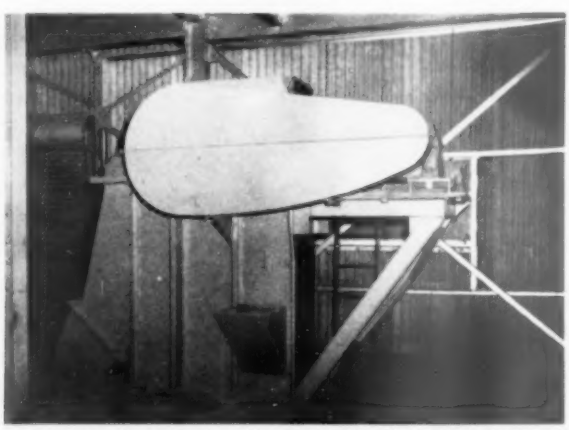
A sample is taken from the kiln feeder overflow stream and tested at regular intervals for lime content and percentage of water. Alkali checks are made weekly.

Dust weight is checked periodically from a sample taken from the dust return pipe.

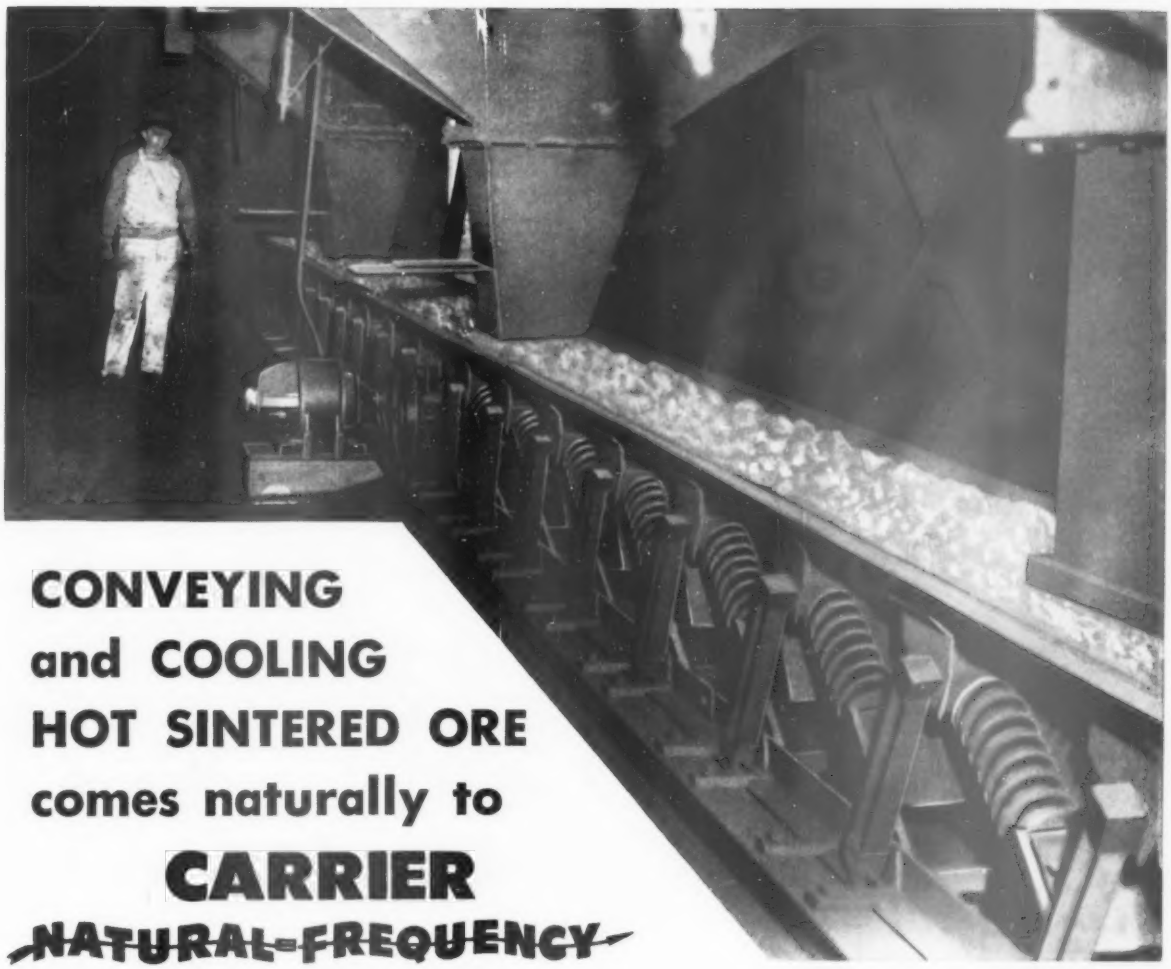
A complete analysis of the finished cement is run once a day.

In addition to the foregoing, the





Left: Dust return conveyor from which a 4-in. pipe (left) delivers dust into a vortex mixer for return into kiln intermixed with slurry. Right: Top of kiln dust elevator showing protected drive



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Carrier Natural-Frequency Conveyor in Alan Wood Steel Co. plant, Conshohocken, Pa.

Conveying and cooling up to 40 tons of hot sintered ore an hour is a "natural" for Carrier Natural-Frequency Conveyors. The 57-foot unit in Alan Wood Steel Company's Conshohocken plant, above, is powered by one 7½ H.P. drive and has a one-piece steel-plate pan, ½" thick. It receives the 700° (F.) ore from hoppers, then quickly vibrates it to storage with a gentle, abrasion-free motion. The conveying speed is 90′ per minute.

Notice that no water jackets are required for cooling — the conveyor's spring hangers have air-gap insulation spaces that not only cool the pan and ore, but also eliminate the possibility of corrosion and leakage!

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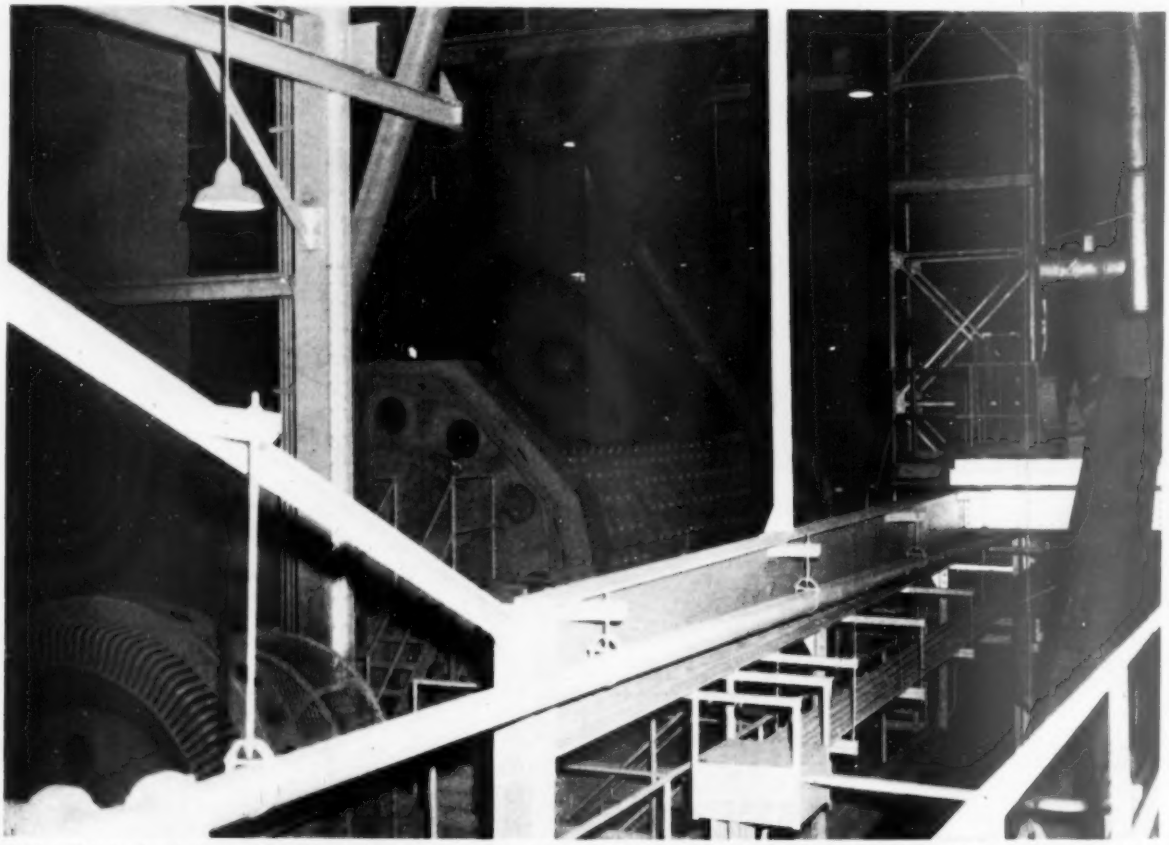


Finish mill is in closed circuit with mechanical air separator. On right may be seen inclined belt conveyor for raising kiln brick from floor below to kiln firing floor

New York State Highway Department requires the clinker autoclave test for soundness. For the purpose, a continuous sample is taken of the clinker as it is discharged from the cooler. These analyses are run every 12 hr. Clinker to be ground into cement for the highways is kept separate in storage and the finished cement is put in tested silos.

Power

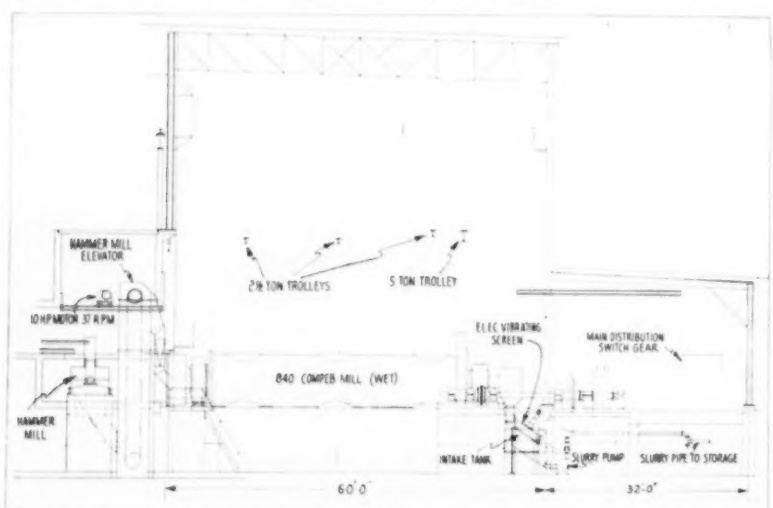
Electric power is purchased from the Niagara-Mohawk Power Co. and brought in at 32,500 volts for stepdown to 2300 volts at the main plant transformers. There are three 1667 kw. transformers and peak plant demand is 2660-2780 kw. From the main plant control panels in the mill room, distribution is to seven unit load center substations where reduction is to 440 volts.

One of the unit substations (300 kva) is for the kiln burning department, a second (225 kva) is for general service and the kiln feed and slurry storage distribution panel, a third (300 kva) is for the packhouse, and a fourth (300 kva) for the kiln feed department. A 1000 kva substation serves three load centers including the finish mill department, raw mill and material handling.

All motors less than 200 hp. operate on 440 voltage, the exceptions being those driving the grinding mills, the induced draft kiln fan and the coal mill which are supplied 2300-volt power.

A 220-hp. synchronous motor drives the motor-generator set (150 kw.) which supplies direct current for the kiln drives. The synchronous motors are regulated by a Westinghouse Slipsyn synchronous motor control to hold near unity power factor for the plant.

(Continued on page 168)



Elevation of raw mill. Feed is first put through hammermill for reduction to ¾-in. top size and then fed by elevator into grinding mill

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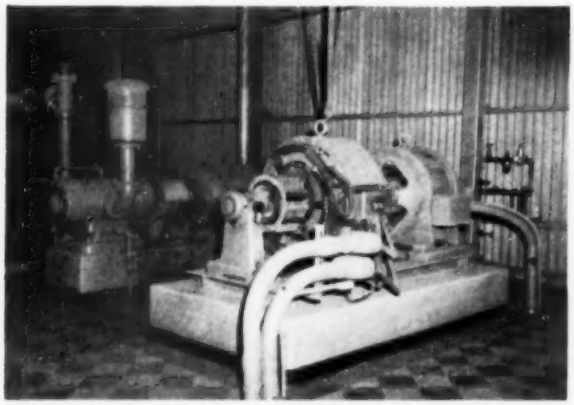
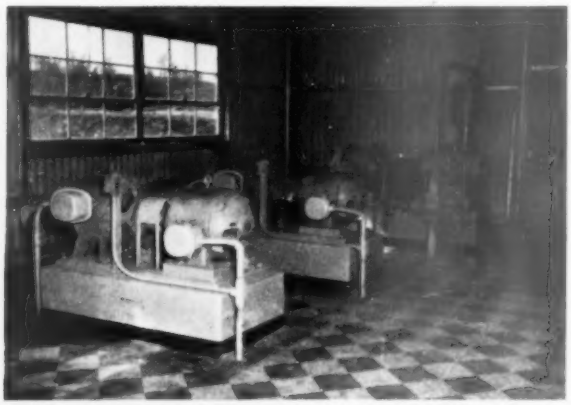
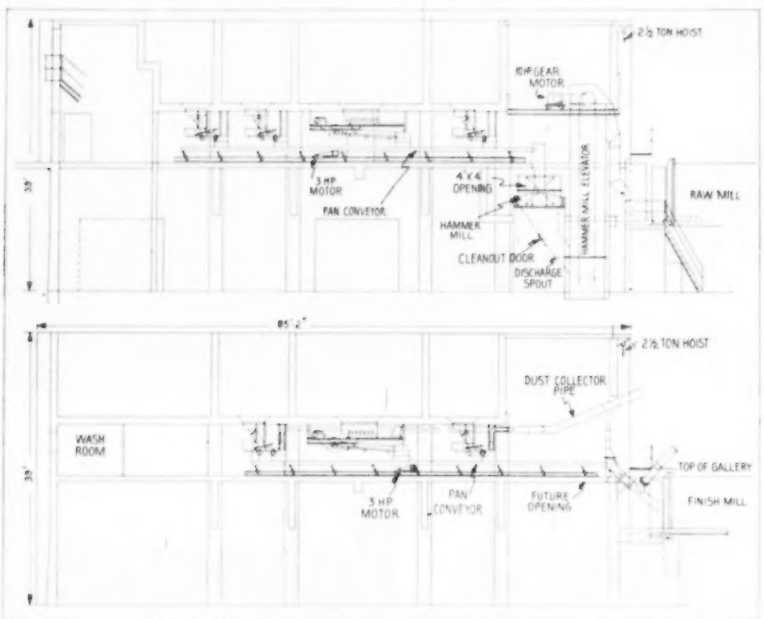




Left: Motor-generator set for kiln drive motors and air compressor in mill building. Right: Two motor-generator sets for compartment mills and a general purpose air compressor



Elevators showing proportioning feeders and oscillating conveyors for the raw mill and for the finish mill

(Continued from page 166)

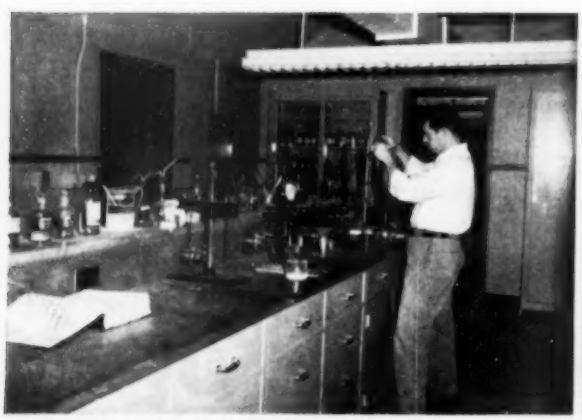
Each substation has its own lighting transformer and all control circuits have indicating lights to show that they are operating. Drives for all equipment in the two grinding circuits are electrically interlocked so that, should a motor stop, all motors driving equipment preceding will automatically be cut. High voltage equipment is grounded at a central point for protection.

Design-Equipment

The general design of the plant was accomplished by the company's engineering department under the direction of vice-president Howard Hanks. Details of design and the general contract for construction were handled by Macdonald Engineering Co. Victor W. Anckaitis of Alpha's engineering staff was resident construction engineer for the overall project, which required 20 months to complete.

Allis-Chalmers Manufacturing Co. furnished the kiln, the two grinding mills, the feeder and drives for this equipment, also the master control panel. General Electric Co. supplied

(Continued on page 170)



Left: Analytical laboratory. Slurry tanks are overhead. Right: This view shows moist closet, scales and balances in control laboratory

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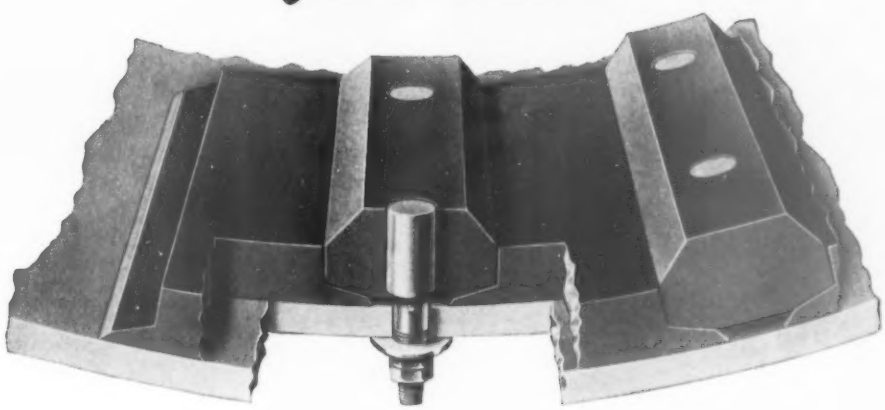

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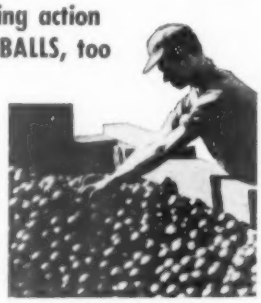

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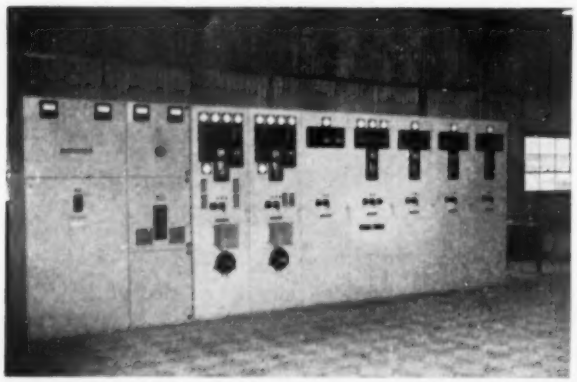
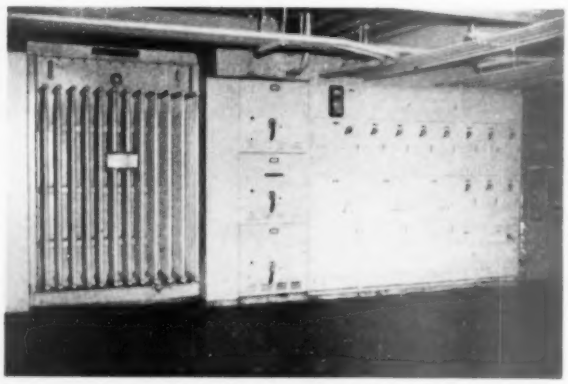
U·S·S LORAIN ROLLED PLATE LININGS AND U·S·S GRINDING BALLS

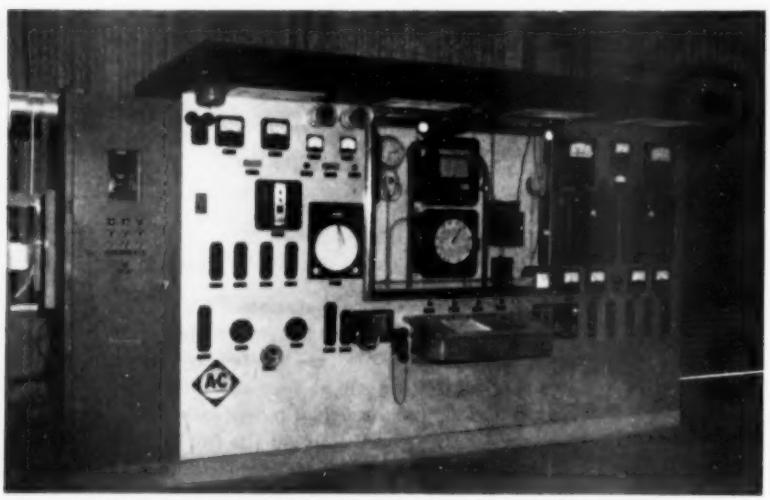
2-994

UNITED STATES STEEL





Left: Main electrical switchgear in mill building. Right: Transformer, motor starters and resistors in mill building basement



All instruments for firing of kiln are centralized on this master kiln control panel

the principal electrical switchgear and unit substations. The majority of electric motors are Westinghouse and some are of Louis-Allis manufacture. The Electric Controller and Mfg. Co. furnished some of the principal large motor starters. Slurry pumps are of Wilfley manufacture and eight Yale chain-block hoists were provided in the plant for handling repairs, grinding media, etc.

James Anderson is superintendent of the plant and D. L. Ziegler is eastern division superintendent of the company with headquarters at Easton, Penn. W. H. Garis is chief chemist.

Alpha Portland Cement Co. has eight plants and a rated total capacity of 12 million barrels of cement annually. Mills are located at Birmingham, Ala.; Cementon, N.Y.; Ironton, Ohio; Jamesville, N.Y.; La Salle, Ill.; Manheim, W. Va.; Martins Creek, Penn.; and St. Louis, Mo.

Company headquarters are in the Alpha building, Easton, Penn.

•

MONARCH CONCRETE CO., Minot, N.D., has been granted a franchise to produce "Homeward" pre-cast concrete steps. The steps have a non-skid design and are cast in sections in 15 sizes for assembly on the job.

Gypsum Production

DOMESTIC MINE PRODUCTION of crude gypsum during the fourth quarter of 1952, as reported by the Bureau of Mines, totaled 2,032,964 short tons, or a fraction of 1 percent above the fourth quarter, 1952 total. Imports were 17 percent lower and production of calcined gypsum was 2 percent higher than during the same quarter of the previous year.

Fourth quarter gains and losses among the gypsum products were irregular. Sanded plasters showed a 58 percent gain. Wallboard and laminated board, a 21 percent gain; Keene's cement, 14 percent; and dental and orthopedic plasters, 10 percent. Principal decreases were as follows: mixing-plant plasters, 23 percent; agricultural gypsum, 21 percent; prepared finishes, 21 percent; and miscellaneous industrial products, 17 percent.

Total figures for 1952 showed that nearly all gypsum products were used in lower quantity in 1952 than in 1951. The only appreciable gain was reported to be in sanded plasters, while sizable losses were reported for fillers and unclassified, uncalcined products; tile and miscellaneous prefabricated products; mixing-plant plasters; plate-glass and terra-cotta plasters; prepared finish plasters; and lath.

Fourth quarter and total yearly production figures for gypsum and gypsum products, in short tons, were reported by the Bureau of Mines as follows:

	Fourth Quarter		Year Totals	
	1952	1951	1952	1951
Crude gypsum:				
Mined	2,032,964	2,026,829	8,070,079	8,704,852
Imported	715,602	858,748	3,067,905	3,448,077
Calcined gypsum produced	1,722,740	1,681,158	6,870,161	7,477,155
Gypsum products sold or used:				
Uncalcined uses:				
Portland-cement retarder	474,347	465,175	1,693,074	1,836,571
Agricultural gypsum	130,582	164,816	583,492	671,589
Fillers and unclassified	5,809	6,375	23,278	33,330
Industrial uses:				
Plate-glass and terra-cotta	15,243	14,457	48,577	62,769
Pottery plasters	11,454	11,659	43,991	48,365
Dental and orthopedic	3,167	2,888	11,037	11,332
Other industrial uses	35,331	42,373	148,938	165,680
Building uses:				
Plasters:				
Base-coat	424,371	471,072	1,904,260	2,165,515
Sanded	51,282	32,387	180,047	124,442
To mixing plants	2,603	3,388	11,583	16,179
Gauging and molding	40,685	46,417	176,941	202,427
Prepared finishes	2,990	3,785	14,544	18,562
Other building plasters	63,570	60,059	220,447	246,133
Keene's cement	12,125	10,648	52,593	53,740
Lath*	570,922	602,500	2,314,555	2,762,254
Wallboard*	907,124	750,329	3,312,544	3,243,698
Sheathing*	28,417	26,525	117,381	116,204
Tile and miscellaneous*	6,507	7,763	27,044	37,861

*M sq. ft.

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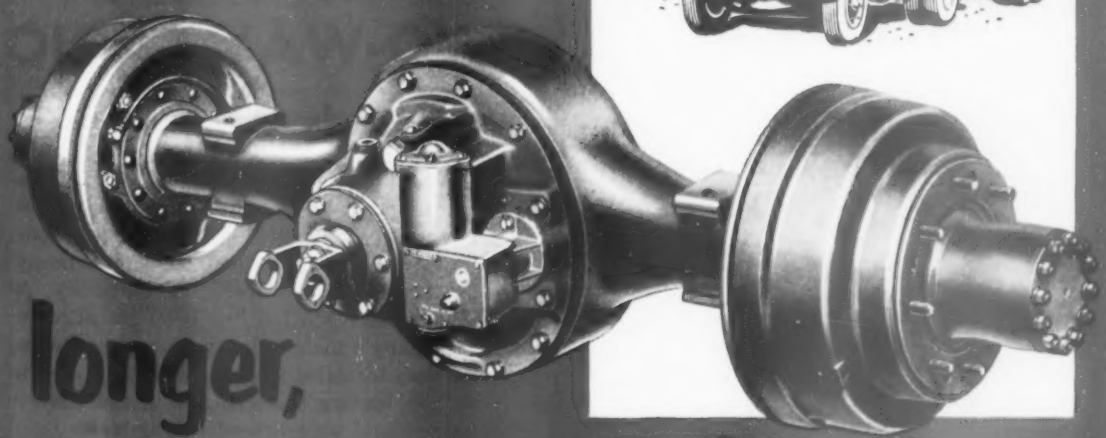

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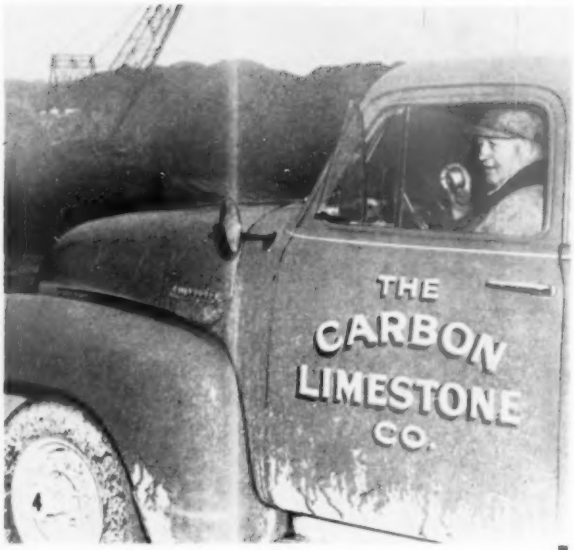

TWO-WAY RADIO

Speeds Operation

THE CARBON LIMESTONE Co., Lowellville, Ohio, whose quarry operations cover 2500 acres and produce 1,500,000 tons of limestone per year, uses two-way radio facilities in many ways to improve its operating efficiency. A G-E base radio station has been installed in the company's main office, with mobile radiotelephones installed in each of seven locomotives, two loading shovels, and in the quarry foreman's and superintendent's trucks.

The main office, crusher and repair shop are located several miles from the quarry, which previously made communications between these points difficult. Previously, an interruption anywhere along the line often resulted in a shutdown of all other operations. Now, in the case of an accident or equipment failure, operators of the radio-equipped vehicles can communicate directly with each other or with the main office, thereby receiving immediate assistance and thus greatly reducing the time required to put the plant in operation again. In one case cited, a break in a large air line supplying the drills was reported and repaired in less than 30 min., as a result of the two-way radio system.

Applications of two-way radio communication: (1) office can be in immediate contact with all plant operations and equipment; (2) quarry, which is several miles from office, can be reached quickly; (3) locomotives equipped with two-way radio; (4) all trucks have radio communication equipment

PAN CONVEYOR ROLLS FOR THREE YEARS ON ABK METAL WHEELS

Three years ago, the Ohio Hydrate and Supply Co. of Woodville, Ohio, installed wheels cast from ABK Metal on the pan conveyor from their crusher . . . and they're still doing a good job. Previously, wheels of white iron or steel developed flat spots and were discarded with less than 18 months service. ABK Metal wheels *stay round* under these abrasive conditions, whether rolling or sliding, and save maintenance dollars in limestone production.

There's reason for ABK Metal's success in this and similar installations where abrasive wear is a major maintenance factor. The controlled structure of this nickel-chrome iron makes it more resistant to abrasion than other metals of the same hardness. The hardness of ABK Metal can be specified from 500 to 700 Brinell.

There are many parts in your plant — grinding mill liner plates, roll heads and wear plates, to name a few — where ABK Metal castings can help you slash your maintenance and operating costs.

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Research

PROSPECTIVE CHEMISTRY

of Cement and Concrete

By NATHAN C. ROCKWOOD

Part VIII. Structure of water and the part it can play in concrete

IN MANY RESPECTS water is the most important ingredient, or if you please, *mineral aggregate* in concrete. This statement does not refer to the purity or contamination of the water used, as the case may be, but to the chemical structure of the water itself, which once completely understood will probably help explain many of the difficulties and inconsistencies encountered in cement and concrete research. Strangely enough water, which constitutes about 50 percent of the volume of hardened cement paste, as it exists in most concrete, has probably been the least studied of any of the various ingredients of the concrete. Yet it is undoubtedly the ingredient most active chemically, or at least the one most likely to promote chemical reactions, and hence the one most likely to lead to the deterioration or destruction of the concrete.

So far as we know, the only attempt to study the actual chemical structure of water in connection with its incorporation in cement and concrete is that of E. Forslind, "A Theory of Water," published in Stockholm in 1952 by the Swedish Cement and Concrete Research Institute as Bulletin 16 of its *Proceedings*. The text is in English. Dr. Forslind's theories may perhaps be best summarized in this quotation from his general introduction, which we will attempt to amplify and simplify in what follows: "Water belongs to the class termed 'associated liquids.' As will appear from subsequent treatment, it may, however, be described as a crystalline system, since the coördination type and general structure of the ice lattice is retained in the liquid phase. The essential difference between the solid and liquid phases seems to be that a limited number of lattice defects of a certain type appear in the liquid phase, leading to an increased anharmonicity [that is, lack harmony or uniformity] of the thermal lattice vibrations, thereby greatly enhancing the probabilities of formation and propagation of dislocations, providing ample opportunities for molecules to change places, in a similar manner as occurs in plastically deformed crystalline solids."

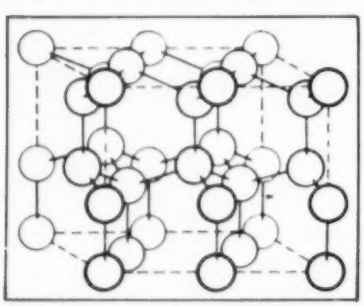

Fig. 1: The ideal structure of water, according to E. Forslind quoted in the text. The ions shown are oxygen only. The hydrogen ions are located between each two O's with various or "hybrid" spacings

Structure of Water

The significance of the above statement is that water is assumed to have, essentially, the same chemical structure as ice. Ice, being made up of crystals, can be examined, and the lattice structure of the crystals identified, by X-ray diffraction; water as a liquid can not be so examined because of the constantly shifting positions of the molecules. It has long been known, of course, that the water molecule is H_2O, and that each of the two hydrogen atoms, having lost its single electron to the oxygen atom, there remains of the hydrogen atom only a hydrogen ion, which is just its center nucleus or essentially a proton (positively charged). This is so very small that its position in the structure by any present method can not be experimentally determined, but can be fairly well established by inferences drawn from theory. Thus the chemical structure of both ice and water (H_2O) has been generally accepted as composed of connected tetrahedra with the oxygen ion in the center, and four hydrogen ions at the corners or apexes of each tetrahedron. This, it should be recalled is the same kind of chemical structure as silica (SiO_2). In ice, under different conditions of temperature and conditions of freezing, the tetrahedra may be joined in different ways, just as they are in silica—tridymite and quartz, for example—so that ice of different densities and other characteristics results.

In ice, as in any crystal, the ions composing it, under stable conditions, are more or less fixed. That is, if the electrons of the ions vibrate or rotate at all, their movement is much restricted. In a liquid or a gas, on the other hand, the electrons have much greater freedom of motion (or vibration) and consequently the ions, of which they are a part, are much more free to change their form or to react with other ions to form new associations or chemical combinations. Thus heating or thermal agitation of any ordinary material "loosens up" the electronic vibrations or rotations, making chemical combinations easier and easier as one proceeds from a solid to a liquid to a gas or vapor.

As in the silica lattice structure, where each oxygen ion is between two silicon ions, in water each hydrogen ion is between two oxygen ions. But, different from the silica structure, the hydrogen ion is not more or less definitely or continuously attached to either oxygen ion, but apparently oscillates between them, so that it may belong to one for an instant and then to another. The difference referred to in the quotation above between associated and nonassociated liquids is explained as follows: "When the interaction between associating molecules is governed by molecular fields of constant angular distribution of intensities, the liquids are nonassociated, probably to imply that the magnitudes of the intermolecular forces are independent of the angular distances between neighboring molecules. . . . When, on the other hand, the angular intensity distributions of the molecular fields vary, the association takes place in preferential directions and the angular distances between neighboring molecules are determined by the particular angular charge distribution that is characteristic of the associated molecules." Water, it will be recalled, is an associated liquid (Fig. 1).

This, if we interpret it correctly, means that the hydrogen ion, which connects the oxygen ions, and thus forms the bond which keeps water an apparently homogenious liquid, is not confined to rigid angular lines or fields of force between the molecules, but is able to constantly change the direction of the bond between any two neighboring oxygen ions. There are limiting planes and angles in which these changes can take place, but it is this mobility of the hydrogen ion bond between two oxygen ions which provides the exceptional mobility or fluidity of water. Also, it is this freedom of the positively charged ion of hydrogen that makes a molecule of water a dipole; in other words a molecule acts like a magnetized rod, positively charged at one end (where

(Continued on page 176)

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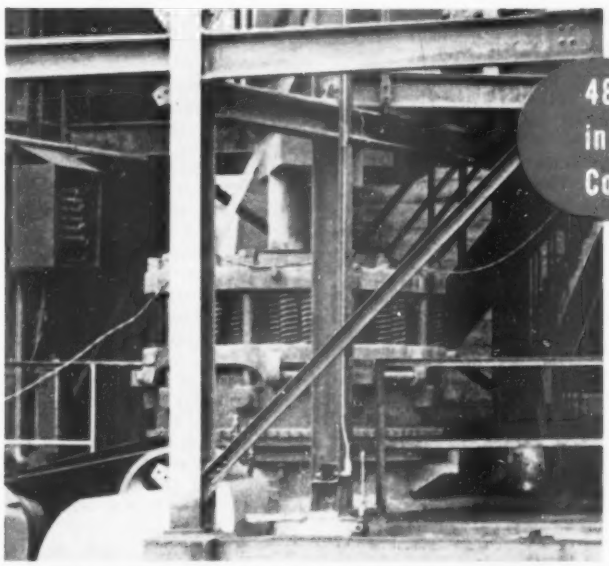
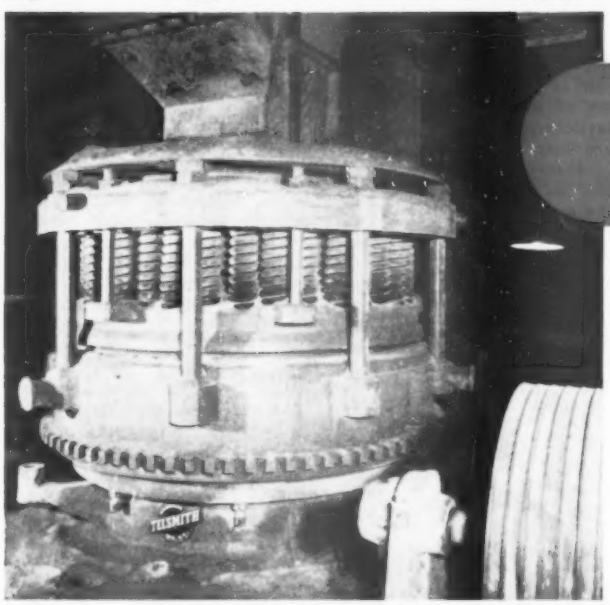


48-FC Telsmith Fine Crushing Gyrasphere in the British Columbia Portland Cement Company Limited plant at Victoria, B. C.

The British Columbia Portland Cement Company Limited wanted to deliver a finer feed to their cement grinding mills—and thus increase output. To do it, they installed early in 1952, a Telsmith 48 Fine Crushing Gyrasphere to crush cement clinker from 2″ to minus 3/8″.

They are thoroughly satisfied!



48-S Telsmith Standard Gyrasphere in Kosmos Portland Cement Co. plant at Kosmosdale, Kentucky.

The Kosmos Portland Cement Co. has operated their Telsmith 48-S Gyrasphere 24 hours a day since July, 1951—crushing 100 tons per hour of 220 to 275-degree limestone from 4½″ down to 5/8″.

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Send for Bulletin No. 274

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the hydrogen ion or ions may be temporarily located), and negatively charged at the other end where one or two negative charges of the oxygen ion may be located. Hence, water molecules are able to attach themselves to either positively or negatively charged ions—a character which makes it possible for water to be called the universal solvent, which it is.

The rest of Dr. Forslind's theory of water is considerably involved in mathematical concepts which it is not necessary to go into here, even assuming the present writer were capable of its extended explanation, which he isn't. It is sufficient to our purposes to say that the author explains some of the pecularities of water, such as its different densities at certain changes in temperature, as the result of changes in gaps or imperfections in the lattice structure, due to changes in length and direction of the constantly varying hydrogen-ion bond, or its "hybrid" character. This results in addition to the ions of oxygen and hydrogen bonded in the "crystal lattice," some free interstitial molecules, which can be here, there or anywhere. From this the author accounts for the thermal properties of water as depending on (1) the total number of molecules involved, (2) the number of gaps or defects in the structural lattice, and (3) the number of lone interstitial molecules.

Structure of Hydroxides

Water in other crystal structures is accounted for as forming hydrates or hydroxides. The difference is probably a bit difficult for the layman to grasp, because in both cases water is driven out if the material is sufficiently heated or dried. The practical difference appears to be mainly the degree of chemical attraction for the water in the material, although the chemist makes this distinction: When a metal oxide dissolves in water, the water is at least partly hydrolized (separated into separate ions of H and OH) and thus the hydroxides are formed. The most familiar one, of course, is calcium hydroxide [$Ca(OH)_2$], which is formed according to the formula $CaO + H_2O$. In this hydroxide two OH ions, each with one negative charge, replace ionically (that is with ionic bonds) the O ion which has two negative charges, and the OH ions are thus bonded directly to the calcium ion by electrostatic or ionic bonds, so there is no hydroxyl or hydrogen connecting bond. The calcium ion is the center of, or coördinated with, six OH ions, two of which are bonded to each Ca, but each OH is also bonded to three different Ca ions, as illustrated in Fig. 2, forming a distinctive crystal.

In the case of lime putty or paste there is additional water which is retained by attractions which are not so readily explained. Some of this extra water (beyond that needed to form $Ca(OH)_2$) is also rather firmly retained. Since many of the calcium hydroxide particles are of colloid size, some of this extra water is probably held by *adsorption*. Thus if a colloid particle of calcium hydroxide is surrounded by OH ions, with these ions polarized so that the H ion is exposed on the surface, it will draw to it the O end of a OH_2 (water) molecule, and there will be a water molecule bonded to the calcium hydroxide particle by an H bond. Or the reverse condition may exist after the first molecular layer of water, in which the O ion is exposed on the surface; and this would attract the H end of another water molecule. In either case this bond, being much weaker than the bond between the Ca and OH ions, is readily broken by mere drying; but to break the chemical bond in $Ca(OH)_2$ requires heating to about 500 deg. C.

The nature of this latter kind of attraction or adsorption is not too well understood, but it implies a bond or connecting link of some kind between the solid particle and the liquid, of something more than the physical phenomenon of *absorption*, where water rises against the force of gravity in a small tube or pore channel—a capillary. In the case of adsorption there is generally assumed to be some kind of chemical attraction between the adsorbed liquid and the solid, which requires appreciable energy to separate, as it required energy (heat of adsorption) to form. Since adsorption is a surface phenomenon, caused by attraction between the exposed ions on the surface of the solid for water molecules (in this instance), the more surface the particles have in proportion to the net aggregate volume, the greater the adsorption. Hence, colloid particles, having very great surface areas in proportion to net weight or volume, if they are hydrophillic (or water-loving) are able to acquire a sheath of water molecules. In the case of hydrophobic (water-hating) particles, the nature of the exposed surface ions is such that they repulse rather than attract water molecules.

A case in point of hydrophobic substances are the saturated hydrocarbons, which means that they have all their valence electrons used up, and being non-polar compounds, there are no static electric charges to come into play to form ionic bonds. Such materials will not adhere to silica aggregates under ordinary conditions because the silica has already acquired a sheath of water molecules, and a bond between the water and the saturated hydrocarbons is not possible. If the silica aggregate is first treated with an unsaturated hydrocarbon, a hydrogen bond is perhaps possible, and this is probably the secret of the oil preparations designed to bind asphalt to silicious aggregates. If the aggregate is heated hot enough to drive out most of the adsorbed surface water, and used hot before it has a chance to acquire some more from the atmosphere, and a hot asphalt used with it, the heat has evidently given enough activity to the electrons of the surface ions of the asphalt to transfer some of them to the silica and to cause some adhesion to the silica.

Water is retained on particles of silica or in the pores of silica much as it is retained on colloid particles of calcium hydroxide, but perhaps with greater bond strength because each O ion in silica has one free space for a valence bond, if this is possible, or the silica ion (or tetrahedron) as a whole is more strongly charged with static electricity because of its larger O content. Silica gel and such rock as opal, which is formed from silica gel, and chert and similar rocks which are partly opal, thus contain varying percentages of adsorbed water. This can all be driven out slowly by heating sufficiently, or long enough, without destroying the crystal structure of the silica, which is proof that the water is not part of the crystal lattice structure.

Structure of Hydrates

Thus far we have considered materials in which water is combined not as water but as water broken down into H and OH ions; and water which is adsorbed and generally con-

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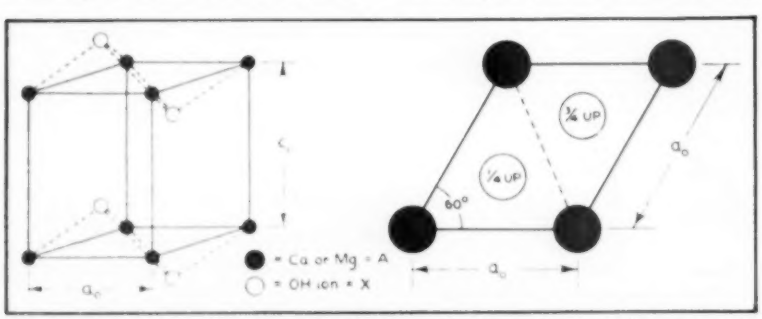

Fig. 2: The structure of calcium hydroxide (hydrate or lime), according to Bulletin 214 of the National Lime Association. The same unit extended in all directions gives the coordination number of Ca as 6 and OH as 3

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Crushed Stone Directors Meet in Canada

National Crushed Stone Association Board of Directors discuss research progress, new markets and percentage depletion

ACCEPTING THE INVITATION of R. G. L. Harstone, of Hamilton, Ont., long the sole representative of the crushed stone industry of Canada on the board of directors of the National Crushed Stone Association, the board held its mid-year meeting at the Seigniory Club, Montebello, Que., June 16, 1953. While the actual sessions were confined to a single day, the meeting really included social and business discussions from June 14 to June 17—and some members of the board stayed beyond then. Most of the members were accompanied by their wives, and part or all of their families. Except for a spell of unusually hot weather, for that northern latitude, conditions were ideal for both transaction of business and pleasure.

Not much beyond routine business was accomplished; included in this was the decision to pay off at once all the remaining mortgage on the building in Washington, D.C., which the association purchased a number of years ago. The board also voted to return to the Homestead at Hot Springs, Va., for its summer meeting of 1954, probably the second week in July. Moreover, the board was so well satisfied with its current meeting that a desire was expressed to return at some near future time.

Staff Reports

As usual the greater part of the day's session was devoted to hearing and discussion of the periodic reports of the staff members. The first of these was by the engineering director, A. T. Goldbeck. This did not go into detail as to the accumulation of research data covering the 28 years he has been on the job, for this would require a large volume. During the past year alone, he said, his laboratory had been engaged in 34 new projects. This figure of course included work undertaken to solve problems of individual members, but in general, all such problems also involve matters of interest and value to all members. And, of course, if time and circumstances permit, a great deal of valuable data on the nature of various

F. B. Thacher, western Pennsylvania

kinds of and uses for rock can be assembled, summarized and interpreted.

Mr. Goldbeck expressed belief that while some of the mystery causes of alkali-aggregate activity in concrete remain to be explained, he (among other researchers in concrete) believes the sclution is getting closer. So does the reporter of this meeting, but we also think that "alkali-aggregate reaction" is blamed for much disintegration of concrete that really stems from other primary causes.

The principal handicap crushed-stone producers have to overcome, in selling their product for concrete aggregate, is the usual specification requirement of more cement and more water for the same workability as concrete mixes made of rounded gravel. Mr. Goldbeck does not believe members of the association are sufficiently familiar with his Bulletin 11 and what it means to them in preparing satisfactory concrete mixes that can compete with sand and gravel mixes.

Rock Dust as Fertilizer

Mr. Goldbeck also submitted a brief report on "Use of Potash Bearing Rocks for Promoting Plant Growth." He avoided use of the term "fertilizer" because at least a few crushed-stone producers are selling rock dust (granite and trap rock) to fertilizer manufacturers for "filler" and are leery of antagonizing them by any inference that the rock dust itself has any fertilizing value. However, if these producers would look up the definition of "fertilizer," which means something that renders soil fertile, they could find good grounds for defining rock dust as a fertilizer. It may take time but it certainly makes soil fertile.

Mr. Goldbeck reviewed the literature on the general subject of the use of feldspathic rock dust in agriculture. He also corresponded with some of the various state agricultural experiment stations. The conclusion he came to is that crushed-stone producers should be very cautious about making claims for their products as having any great value as fertilizers. ROCK PRODUCTS has expressed its own views on this subject, as recently as April, 1953, and Mr. Goldbeck referred to these articles in a general way in his summary.

Field Work

Jos. E. Gray, field engineer, working under Mr. Goldbeck's direction, has pretty well covered the eastern half of the country in his field trips to help solve the more immediate problems of member producers. Originally, these were largely sales or service or inspection problems, but Mr. Gray, because of his now extensive acquaintance with the operations of the member companies, is able to give operators helpful advice on operating and production problems. Mr. Gray is also taking over more and more of the other association contacts, such as the American Road

(Continued on page 180)

Three past-presidents—Otho M. Graves, G. A. Austin, and W. F. Wise (standing)

coal cleaning

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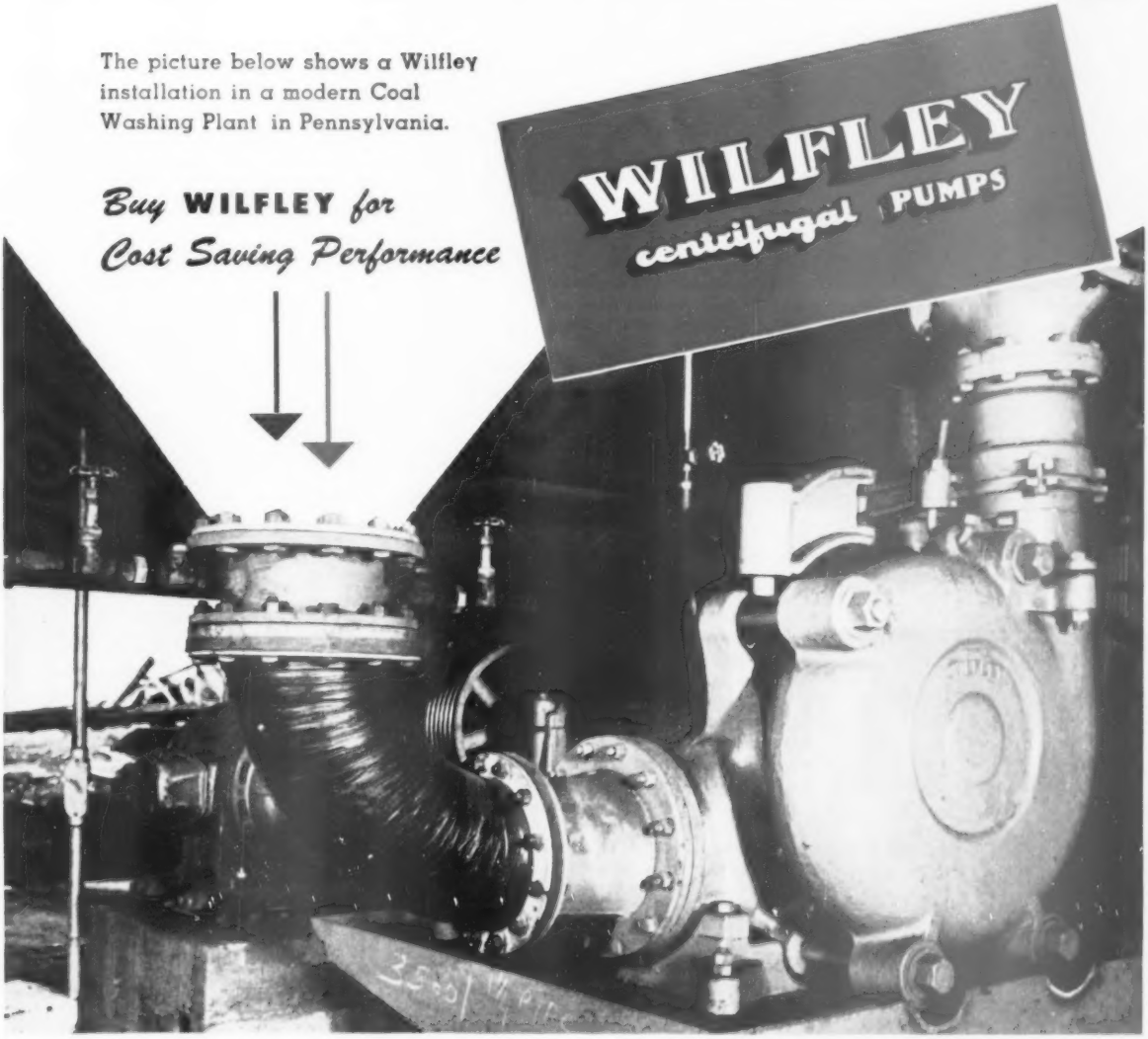

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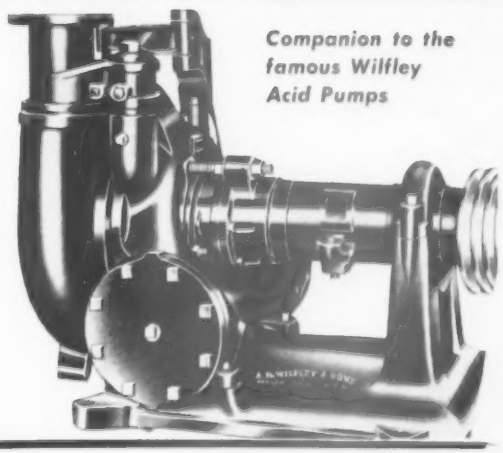

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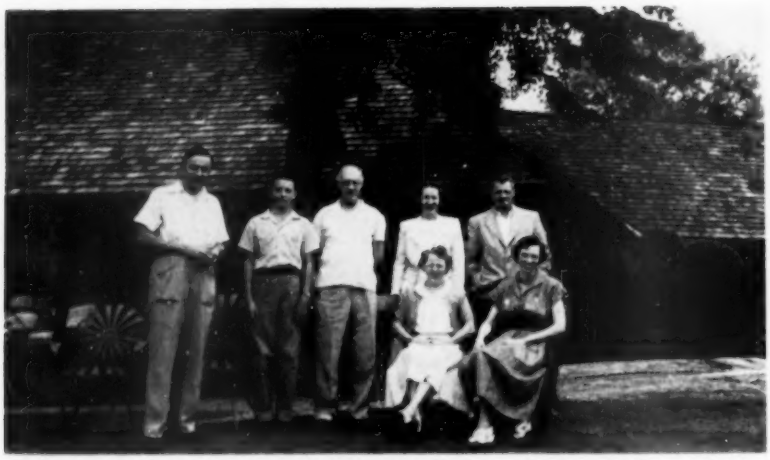

Group at golf club. Left to right, seated: Mrs. J. R. Boyd, Beatrice Gay; standing, J. E. Gray, Steve Weston III, J. R. Boyd, Mrs. J. V. Owens, and J. V. Owens

Builders Association, and various other engineering groups interested in the use of crushed stone. Special attention was given during the last year to bituminous pavement mixes, more particularly in an effort to show how producers are successfully using stone screenings.

Administrator's Report

J. R. Boyd, administrative director, reported the association in excellent

Two representatives of Scottish descent—Bruce Campbell of Maryland and R. G. L. Harstone of Canada

financial condition, so much so that it has been possible to set up a retirement pension plan for staff employes. The membership list of the association now includes 133 active (producer) company members and 102 members (machinery, etc.) of the Manufacturers' Division. Mr. Boyd also reviewed the status of current legislation in Congress.

Percentage Depletion

Russell Rarey, Columbus, Ohio, chairman of the association's committee on percentage depletion, was not able to report anything definite as to how the Treasury Department will eventually handle the problem of 5 and 15 percent depletion write-offs for crushed stone used for ordinary commercial purposes. Some producers are taking 15 percent on all limestone products made from stone of chemical and metallurgical grade; others attempt to apply the 15 percent only to end products used by the chemical and metallurgical industries. The law is not specific as to whether end products were intended to be covered or not, and the commissioner of internal revenue will not take the responsibility of writing something into the law that is not there. Congress itself will eventually have to supply the interpretation originally intended. As long as the question is unanswered, the producers of limestone products will in some cases have an edge on competition with hard rock producers. In the meantime there is little the industry can do other than to continue to support the whole philosophy of percentage depletion. Discussion brought out that there appears little danger that percentage depletion will be dropped out of the code.

Resolutions

The board adopted a resolution to be sent to Thomas H. MacDonald, recently retired after many years' public service as federal commissioner of public roads, expressing recognition of his outstanding accomplishments. A resolution of sympathy was adopted to be sent to the widow and family of the late Fred O. Earnshaw, for many years active in the association as a

(Continued on page 206)

Steve Weston III (may be future president of N.C.S.A.I) and J. R. Boyd, executive secretary

John H. Odenbach gives serious thought to problem

James Savage, treasurer of the association, examines financial statement

A corner of the conference table

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A. S. T. M. Presents Reports On Cement and Concrete Aggregates

By H. F. GONNERMAN*

OVER 2500 MEMBERS attended the 56th Annual Meeting of the American Society for Testing Materials at Atlantic City, June 28 to July 3, representing the nation's leading authorities on materials of engineering.

Members of committee C-1 on cement and committee C-9 on concrete and concrete aggregates, who were honored by the society by receiving 1953 Awards of Merit—an award given to men who have rendered outstanding service to the society, particularly in technical committee work—were: Dalton G. Miller, materials engineer (retired) Bureau of Public Roads, U.S. Department of Commerce, University of Minnesota, St. Paul, Minn., and Roderick B. Young, associate director of research, The Hydro-Electric Power Commission of Ontario.

L. W. Walter, consultant on concrete, Jersey City, N. J., was one of those who received recognition as 50-year members; among those receiving recognition as 40-year members were: Louis Anderson, formerly chief chemist, Alpha Portland Cement Co., Easton, Penn.; Ralph E. Roscoe, vice-president, Bessemer Limestone and Cement Co., Youngstown, Ohio, and Giant Portland Cement Co., Philadelphia, Penn.

C-1 Annual Report

In the report of committee C-1 to the society, the committee made the following recommendations with respect to standards relating to portland cement:

(1) The acceptance of a proposed "Tentative Method for Mechanical Mixing of Hydraulic-Cement Mortars of Plastic Consistency."

(2) A reduction in the percent of air in Table II of the Standard Specifications for Portland Cement (C150-52) from 15 to 12 for all types of cement.

(3) Four changes in the Standard Specifications for Masonry Cement (C91-51) were recommended to bring the procedure for determination of strength into closer agreement with the corresponding procedure in the Standard Test for Compressive Strength of Hydraulic-Cement Mortars (A.S.T.M. C109).

(4) Revisions in the Tentative Method of Test for Bleeding of Cement Pastes and Mortars (C243-52T) were designed not only to introduce certain desirable refinements in the details of procedure but also to replace hand mixing of the pastes and mortars with mechanical mixing.

(5) Revisions were made in the Tentative Method of Test for Air Content of Hydraulic Cement Mortar (C185-50T).

(6) Revisions in Tentative Specification for Portland-Blast-Furnace Slag Cement (C205-51T), which will bring the setting time requirements of this specification into agreement with those for portland cement (C150), and for air-entraining portland cement (C175), and will make use of the revised Vicat test method for time of setting.

(7) Tentative revisions in the Standard Method of Test for Fineness of Portland Cement by Air Permeability Apparatus (C204-50) to improve and clarify the test, and in the Standard Specification for Masonry Cement (C91-51). The revision in the masonry cement specification provides that the autoclave test be used in the determination of soundness of masonry cement and that the maximum permissible autoclave expansion shall not exceed 1 percent.

The autoclave test for masonry cement is the same as that for portland cement except that the test bars are to be stored in a moist cabinet for 48 hours ± 30 minutes before the initial measurements of the bars are made and the bars then returned to the moist cabinet storage for an additional 5 days before they are subjected to the autoclave test. The difference in length of the test specimen at 48 hours and after autoclaving is reported as the autoclave expansion of the cement. In the autoclave test for portland cement the bars are stored in the moist cabinet for only 24 hours ± 30 minutes before they are subjected to the autoclave test. The maximum autoclave limit for all types of portland cement is 0.5 percent.

(8) A number of other tentative revisions of the Standard Specifications for Portland Cement (C150-52), for masonry Cement (C91-51), and for several of the standard methods of test, all of which had been issued previously, were recommended for adoption as standards.

(9) The adoption as Standard of the Tentative Specification for Air-Entraining Portland Cement (C175-52T). This tentative specification was first issued in 1942 and has been revised from time to time in the light of experience gained with the specification.

Also recommended for adoption as Standard was the definition of the term "Addition" which forms a part of the Tentative Definitions of Terms Relating to Hydraulic Cement (C219-51T).

All of the foregoing recommendations had received a favorable vote in the committee and were accepted by the society when the committee's report was presented, subject to letter ballot of the society.

Roderick B. Young, associate director of research, The Hydro-Electric Power Commission, Ontario, Canada, who received the Award of Merit in recognition of pioneering work in concrete research, which has contributed to durability in concrete construction, and his service on Committee C-9 on Concrete and Concrete Aggregates

Current Activities of Committee C-1 Working Committees

At the meeting of committee C-1 on July 3, the advisory committee of C-1, acting upon a recommendation from the sponsoring committee for portland cement that the specification for portland cement should include a requirement for premature stiffening, appointed a special working committee on "Premature Stiffening."

The duties of this special working committee are to:

(1) Define what is meant by premature stiffening,

(2) Study the factors involved, and

(3) Prepare a method of test for premature stiffening.

The working committee on sulfate

*Consulting engineer and research consultant

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resistance (William Lerch, chairman) described the previous attempts of his working committee to develop a performance test for sulfate resistance. He mentioned the studies that were made of lean mortar bars immersed in various sulfate solutions and of the sulfate susceptibility test. The report on these tests by David Wolochow was published in the A.S.T.M. Proceedings, vol. 52, 1952, page 250. Since the results obtained by the different laboratories with these two methods of test were not sufficiently reproducible to justify proposing them as A.S.T.M. Tentative Methods of Test, the working committee is starting another study of the problem using a new approach. This involves incorporating an excessive amount of gypsum (7 percent SO_3) in the cement, when making up the mortar bars. The bars are to be stored in water and their expansion measured from time to time. This procedure, which activates the sulfate action, is easier to perform and gives results which seem to be more reproducible than any of the other methods that have been tried previously.

A program of cooperative tests has been outlined which will involve the testing of approximately 104 1- x 1- x 10-in. bars by each cooperating laboratory. The bars will be cured in molds for one day and then stored in water at constant temperature.

Mr. Lerch mentioned the annotated bibliography that was recently completed by Dalton G. Miller, Philip W. Manson and Robert T. H. Chen, entitled "Sulfate Resistance of Portland Cements, Concretes and Mortars." This bibliography was sponsored by the working committee on sulfate resistance, and was prepared in connection with the work conducted under a cooperative agreement between the Bureau of Public Roads, the U.S. Department of Commerce, the Division of Agricultural Engineering of the University of Minnesota and the Division of Water Resources of the Minnesota State Department of Conservation. The University of Minnesota lists this bibliography as Paper No. 708—Miscellaneous Journal Series. Copies can be obtained by writing to Dalton G. Miller, senior author, who was chairman of the working committee on sulfate resistance for many years.

The working committee on time of setting, E. E. Berger, chairman, is making an evaluation of all the test data accumulated by the working committee during the past 12 years, and is studying the use of mechanical mixing in making time of setting tests of cement in mortar.

The working committee on heat of hydration, W. J. McCoy, chairman, reported that the revisions of A.S.T.M. "Standard Method of Test for Heat of Hydration of Portland Cement" (C186-49), have been approved and will be incorporated in the standard method.

Mrs. Katharine Mather, chief, Petrography Section, Special Investigations Branch, Concrete Research Division, Waterways Experiment Station, Corps of Engineers, received the Sanford E. Thompson Award for her paper, "Applications of Light Microscopy in Concrete Research"

The working committee on bleeding, plasticity and workability, Henry L. Kennedy, chairman, reported on its activities and indicated the desire of the committee to arrive at a definition of workability in concrete in cooperation with committee C-9.

The working committee on fineness, R. L. Blaine, chairman, is investigating several different methods of test for determining the specific gravity of cement.

The working committee on strength, C. E. Wuerpel, chairman, has made an extensive review of the Standard Method of Test for Compressive Strength of Hydraulic Cement Mortars (C109) preparatory to a revision of that method to provide for mechanical mixing of the mortar.

The working committee on SO_3 content, H. S. Meissner, chairman, reported that the results of tests for optimum SO_3 content which had been submitted by 14 cement plants for study had been sent to all members of committee C-1 as information.

The special working committee on slag cement, F. H. Jackson, chairman, is drafting a specification for water-quenched blast-furnace slag, mixed with hydrated lime, which it plans to have ready for submission to committee C-1 at its meeting next October.

The sponsoring committee on portland cement, C. H. Scholer, chairman, recommended that a special committee be appointed to develop a test for premature stiffening and that the working committee on bleeding, plasticity and workability be requested to suggest appropriate limits on bleeding for incorporation in the Standard Specifications for Portland Cement.

E. J. Wechter, chairman of the sponsoring committee on masonry cement reported that his committee voted unanimously to recommend to C-1 a number of tentative revisions in the Standard Specifications for Masonry Cement (C91). A major revision is the adoption of mechanical mixing of the mortars to replace hand mixing.

The sponsoring committee on blended cement, L. R. Forbrich, chairman, has had under consideration a revised draft of a specification for portland-pozzolan cement. In view of the fact that a number of suggestions have been submitted in connection with this specification, a new draft which will cover most pozzolanic materials, will be prepared and submitted to committee C-1 before its next meeting.

The working committee on chemical analysis, W. C. Hanna, chairman, mentioned the work being carried out on the development of a method for the direct determination of Al_2O_3 in portland cement. Results obtained with this direct method, as now developed, were said to agree within 0.1 percent with those obtained with the present A.S.T.M. method for determining Al_2O_3. A complete report on this work is to be presented at the 1953 fall meeting of the American Chemical Society in Chicago. The committee is continuing its investigation of flame photometers for use in cement analysis and its study of the method of determination of an air-entraining agent in cement.

Talk on European Methods of Testing Cement

A practice which has been followed with success by committee C-9 on concrete and concrete aggregates in having brief informal talks presented at its meeting by members of the committee was inaugurated by committee C-1 at the Atlantic City meeting. R. L. Blaine of the National Bureau of Standards gave a talk on "Practice of Testing Cement in Europe." Mr. Blaine in his visits to European laboratories was interested in investigating:

(1) New methods of test, and

(2) What European laboratories are doing to reduce the variations in the testing of cement in different countries.

Mr. Blaine stated that each country has its own specification for cement and that in evaluating test results by different methods the use of conversion factors was required. Research conducted on their own cements by the different countries was of limited value to other countries owing to differences in test methods. An attempt is being made to develop standard methods of test for cement that are related to concrete properties. The hope is that the same methods, and if possible, the same specification requirements will be used throughout Europe.

(Continued on page 187)

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A.S.T.M. Meeting

(Continued from page 184)

Committee C-1 plans to holds its fall meeting at Purdue University October 19 to 21 prior to the meeting of committee C-9 on concrete and concrete aggregates which is scheduled for October 21 to 23 at Purdue.

Annual Report and Meeting of Committee C-9 on Concrete and Concrete Aggregates

In its annual report to the society, committee C-9 recommended the acceptance for publication of three new tentative methods of test as follows:

(1) Test for Resistance of Concrete Specimens to Slow Freezing in Air and Thawing in Water,

(2) Test for Fly Ash as an Admixture for Portland Cement Concrete,

(3) Tentative Specifications for Liquid Membrane-forming Compounds for Curing Concrete.

A number of revisions, some of an editorial nature, were recommended in four tentative methods of test, and a revision to "Standard Methods of Test for Abrasion of Graded Coarse Aggregate by Use of the Deval Machine" (D289-46) was recommended for immediate adoption. Other recommendations were: To replace the "Standard Method of Test for Coal and Lignite in Sand" (C123-44) with the "Tentative Method of Test for Lightweight Pieces in Aggregates" which was appended to the committee's report, and to advance "Tentative Specifications for Waterproof Paper for Curing Concrete" (C171-49T) to Standard.

At the meeting of committee C-9 on July 1, the chairmen of the various subcommittees reported on the current status of their assignments. All of the subcommittees have been active during the year.

P. M. Woodworth, chairman, subcommittee on methods of testing and specifications for lightweight aggregates for concrete reported that his subcommittee, after much study, had prepared two proposed specifications for lightweight aggregate which represent significant revisions in the present A.S.T.M. specification C130. One of these proposed specifications pertains to lightweight aggregate intended for use in structural concrete where both lightness in weight and compressive strength are of prime importance. The other proposed specification pertains to lightweight aggregates intended for use in concrete masonry units in which lightness in weight is the important consideration. These two proposed specifications will be submitted to letter ballot of committee C-9.

C. E. Wuerpel, chairman of the committee on methods of testing and specifications for admixtures reported that a special task force appointed from his subcommittee has been working on the development of specifications for fly ash. Their proposed specifications were discussed by the subcommittee and as a result of the suggestions made, the task force will submit a single specification for fly ash which will include alternate clauses to cover requirements for special purposes.

The "Proposed Tentative Methods of Test for Fly Ash as an Admixture for Portland Cement Concrete," which were appended to committee C-9's report, were approved. They will, however, probably be revised considerably in order to take into account the requirements incorporated in any final proposed specification for fly ash.

After the presentation and discussion of the subcommittee reports, four informal talks were given by members of the committee, as follows: The "Distinction of Limestone and Dolomite" was discussed by D. O. Woolf of the Bureau of Roads; Prof. E. L. Spencer of Northeastern University described "An Undergraduate Cement and Concrete Testing Laboratory Course" which is given at the university; J. R. Dwyer, in charge of the Cement Reference Laboratory at the National Bureau of Standards, reviewed the work of his staff on "Inspection of Concrete Compression Test Procedures"; and the "Behavior of Elastic Waves in Concrete" was discussed by J. R. Leslie, research engineer, The Hydro-Electric Power Commission of Ontario.

These informative informal talks added much interest to the C-9 meeting and others will be given at the fall meeting of C-9 to be held at Purdue University October 21 to 23.

Concrete Sessions

The program of the annual meeting included two sessions at which eleven papers on subjects relating to concrete and concrete materials were presented.

Dalton G. Miller, a retired materials engineer, Bureau of Public Roads, now with University of Minnesota, was given the Award of Merit for notable service with Committee C-1 on Cement

On Tuesday evening, June 2, at the session on Significance of Tests of Concrete, a group of six interesting papers were presented on subjects in the field of aggregate and concrete testing.

The paper "Porosity Determinations and the Significance of Pore Characteristics of Aggregates," by D. W. Lewis, W. L. Dolch and K. B. Woods of Purdue University was ably presented by Mr. Dolch. This paper reviewed the pertinent information on the porosity of coarse aggregates used in portland cement concrete and discussed the methods used to measure the porosity of aggregates, including total porosity, pore size and distribution. The significance of porosity of coarse aggregates, its influence on the chemical and physical properties of the aggregate and the relationship of porosity to durability of concrete in freezing and thawing were pointed out.

According to the authors, it would be difficult to prove that any other physical property of aggregates is of greater importance than the porosity characteristics (amount, size and continuity of the pores). The pore characteristics of a coarse aggregate not only influence the physical durability properties of concrete but also any potential chemical reaction.

In his paper on "Significance of Tests for Chemical Reactions of Aggregates in Concrete," William Lerch of the Portland Cement Association discussed the beneficial and deleterious chemical reactions involving aggregates in concrete. He described the progress that has been made in developing methods of test for aggregates that will determine their potentialities for producing deleterious chemical reactions in concrete and their significance. Since some of the most reliable methods currently available require such a long time to provide significant results, he stressed the urgent need for further study of test procedures.

E. C. Higginson and O. J. Glantz of the Bureau of Reclamation, in their paper on "The Significance of Tests on Sulfate Resistance of Concrete," described the specimens, procedures, and methods of evaluation employed in the laboratory and in the field in testing concrete for sulfate resistance. In the conclusions to their paper the authors recommend the use of cements of low tri-calcium aluminate content (8 percent or less depending on the sulfate concentration in the soil or water) in concrete structures which may come in contact with sulfate-bearing soil or water. Increasing the cement content of the concrete increases its sulfate resistance; calcium chloride in concrete reduces its resistance and entrained air in concrete may increase its resistance to sulfate attack. The authors consider that the standardization of labo-

(Continued on page 210)

Agstone

The New Jersey Zinc Co., Austinville, Va., a large producer of zinc and lead, is recovering a dolomitic agricultural limestone from tailings in processing ore

By L. DAVID MINSK

Loading railroad cars from drained tailings pile. Open-top hopper cars are used as the agstone has a relatively high moisture content

By-Product of Zinc and Lead Processing

BERTHA MINERAL DIVISION of The New Jersey Zinc Co., with a plant at Austinville, Va., is primarily engaged in producing zinc and lead concentrates. Austinville is located in an historic mining area which has produced lead since Revolutionary War days. The mine has been a large producer of zinc since shortly after the turn of the century. Not until 1927, however, was the limestone gangue marketed extensively as an agricultural material. Sales of Austinville limestone have risen to 350,000-400,000 tons per year at the present.

Zinc and lead extraction is carried out by froth flotation, and after all values are removed the tailings are piped by gravity to either of two extensive tailings piles. Each area will hold over 200,000 tons. One is used for railroad car loading and the other for truck shipments. Rail shipments account for over 85 percent of all material shipped.

Agstone Analysis

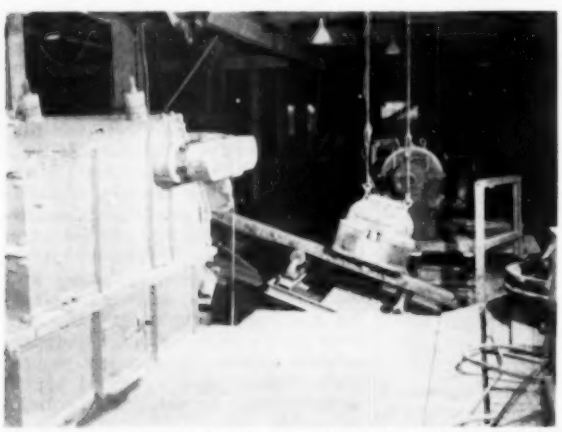
The agstone is a dolomitic limestone, averaging 50 percent $CaCO_3$ and 40 percent $MgCO_3$. Calcium carbonate equivalent is 97.2 percent. Moisture content averages 4 percent, with 8 percent the guaranteed maximum. Guaranteed sieve analysis is 50 percent through 100 mesh and 100 percent passing 20 mesh. The material meets all P.M.A. specifications and is shipped into 120 counties in Virginia and North Carolina, with 300 miles the farthest haul.

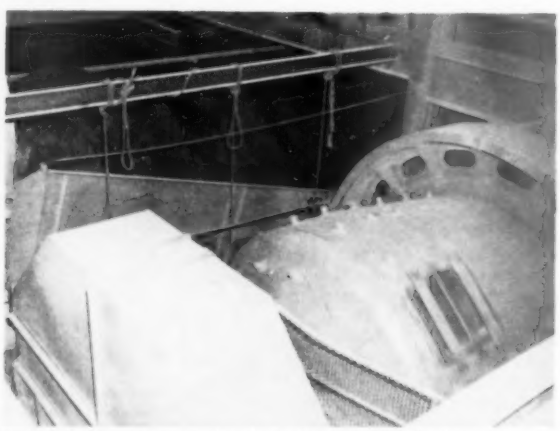
W. L. Albers, superintendent of the plant

A novel method of distributing tailings in the pile is used. A 4- or 6-in. steel pipeline on trestles transports the tailings by gravity to one of the tailings areas. The line terminates in three 2-in. fire hoses, each of which builds up a side of the pond. Material is bulldozed to form a rectangular dam. Two men watch the pile constantly while it is building, and move the fire hoses to keep the pile building evenly. Only one pile in the two areas is built at a time; when the carloading area is being drained or has sufficient material stockpiles, the flow is diverted to the truck loading area. Loading from the drained piles is done by a ¾-cu. yd. Bucyrus-Erie 22B shovel and a 1-cu. yd. Northwest shovel.

A 30- x 42-in. Buchannan jaw crusher located underground is the primary crusher. The minus 4-in. dis-

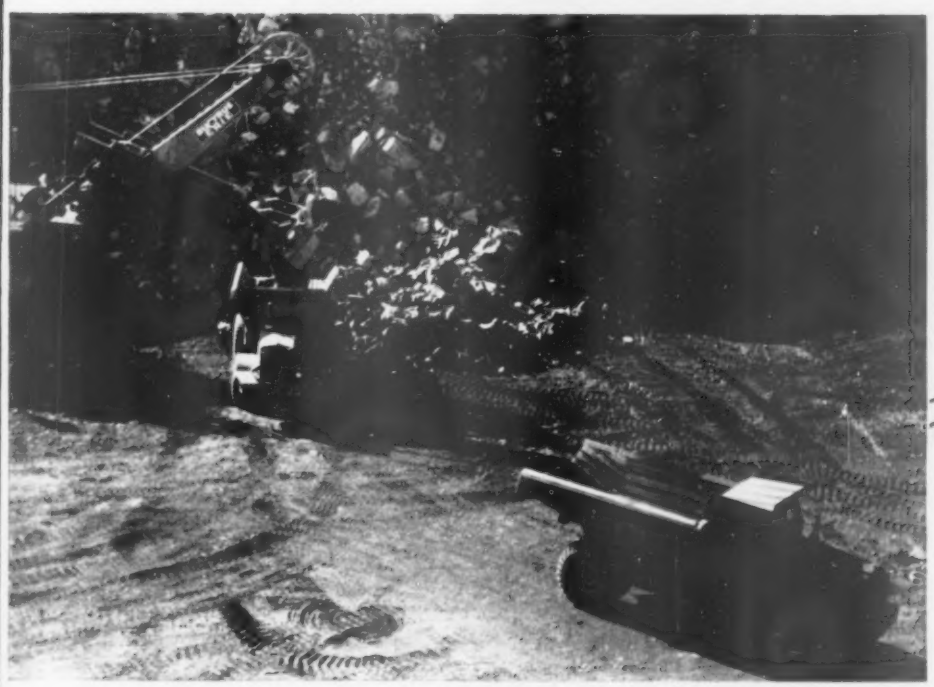
(Continued on page 190)



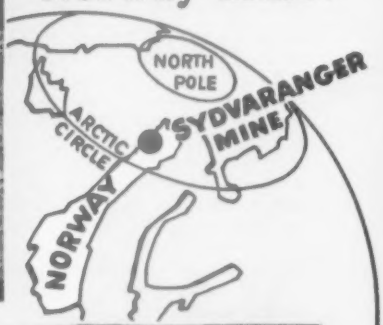


Left: The 3- x 6-ft. enclosed vibrating screen (left) is fed material from the tertiary 36-in. gyratory crusher by belt conveyor in background, over which is mounted a magnet. Right: The classifier and ball mill

DEMONSTRATED...SOLD...REORDERED!



"Eucs" Maintain 87% Job Availability at Norway Mine!



At Sydvaranger iron mine in Norway, a Model TD 22-ton Rear-Dump "Euc" on demonstration worked with a fleet of tractor-trailer units of other make. Performance of this "Euc" and its 25% greater job availability was so impressive that seven additional Rear-Dump Euclids were purchased . . . the original hauling fleet is being replaced or converted to other use.

Working 24 hours a day, 6 days a week, the year 'round, "Eucs" at Sydvaranger have averaged 87% job availability including time required for periodic servicing and installation of special equipment. They are loaded with iron ore and heavy overburden by a 4½ yd. shovel, and have a round trip haul of about 3½ miles.

The simple but rugged design of job-proved "Eucs" is paying off at this mining operation 400 miles north of the Arctic Circle just as it is on hundreds of other mine, quarry and earth moving jobs throughout the world. Have your Euclid Distributor provide a hauling production and cost estimate based on the use of Euclids for your work . . . there's no cost or obligation.

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Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Screening plant in carloading area for reworking material removed from the bottom of piles which has relatively little lumpy content

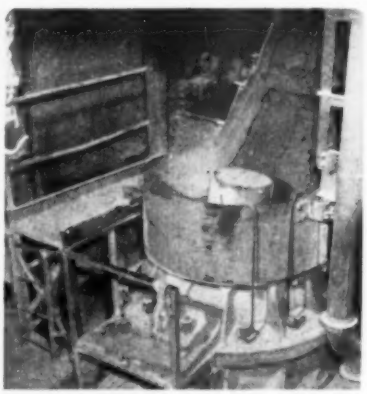
charge is hoisted by skip cars to bins at the mill building. Two identical circuits process the material in the mill; for convenience only, one will be described here. The secondary crusher is a 36-in. coarse-bowl Symons cone set for 1½-in. discharge. The secondary crusher discharge is carried by belt conveyor to the tertiary crusher, passing over a Merrick Weightometer on the belt. This is also the sensing element for automatic pan feeder control of the secondary crusher feed. A Ratograph is set for the required feed tonnage, and this control acts through a No. 55 Reeves drive on the pan feeder to give a constant feed over a range of 12-80 t.p.h.

The tertiary crusher is a 36-in. Telsmith Gyrasphere, set for ⅝-in. discharge. The product is elevated by belt conveyor to a 3- x 6-ft. enclosed vibrating Symons rod-deck screen. An 8- x 12-ft. Marcy end-discharge rod mill follows; feed to this has a top size of ¾ in. (4.7 percent) with 90.4 percent on 28 mesh and 2.3 percent minus 200 mesh. Rod mill charge is 38½ tons of 3-in. x 12-ft. rod; steel liners are Lorain. The rod mill turns at 16 r.p.m. and the bulk of the grinding is accomplished in this mill.

Rod mill discharge falls to a 78-in. x 25-ft. Wemco Simplex double-flight, spiral classifier which rotates at 4 r.p.m. Oversize is sent to a Hardinge tricone ball mill (8-2-4-7 ft. size) having a charge of 20 tons of 1⅝-in. forged steel balls. This feed is 1.4 percent retained on No. 3 mesh, 31.6 percent on 14 mesh. Discharge from the ball mill is 100 percent passing 4 mesh, .25 percent retained on 14 mesh and 55.7 percent on 100 mesh. This is returned in closed circuit to the spiral classifier. Overflow from the classifier is the flotation feed.

Grind for flotation is kept closely between 20 and 25 percent plus 100 mesh, and 50 percent minus 200 mesh. The mechanics of flotation require that an excess of minus 200-mesh material be avoided. A new constant density recorder on the classifier overflow has been installed to aid in maintaining the proper size feed to the flotation cells.

These grinding mills are running on water-lubricated Micarta bearings. The company has designed a water-soluble oil lubricator which is automatically applied to the bearings in the event of a power failure or in case of failure of the lubricating water supply. It can also be operated manually.



One of the 36-in. secondary crushers which has been replaced by a coarse-bowl cone

Zinc and lead minerals are removed in conventional mechanically agitated rougher and cleaner flotation cells. Automatic pulp samplers accurately sample the feed to the flotation section, both concentrates, and the tailings.

Power is received at the plant at 13,200 volts and is stepped down to 440 volts in unit substations.

Superintendent of the plant is W. L. Albers.

Information on Army Engineers' Projects

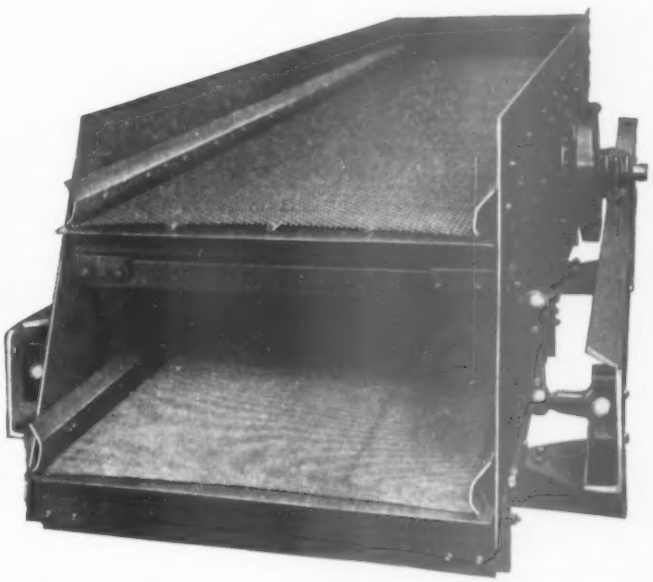
THE DISTRICT ENGINEERS OFFICES of the Corps of Engineers, U.S. Army, at periodic intervals, issue a mimeographed publication, *Construction Bulletin*, which gives information concerning Army and Air Force construction projects to interested persons. The bulletin is divided into four categories: Advertised projects—bids to be opened soon; projects which have not yet been advertised; construction contracts—awards not yet made on bids previously taken; and construction projects in progress. Also published periodically is a bulletin listing the architectural and engineering firms that have been awarded contracts to design projects. The publications may be obtained as issued by writing to the district engineer, on company letter-head, requesting to be placed on the mailing list.

Safety Film Directory

THE NATIONAL SAFETY COUNCIL recently announced publication of the 1953-1954 edition of the "National Directory of Safety Films," listing 963 motion pictures and slide films for use in training personnel in occupational accident prevention. Films in the related fields of first aid, fire prevention, civil defense and home and traffic safety are also included. The directory will be kept up-to-date with supplements which will be published quarterly. Copies of the directory are available from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., for $0.75 each.

One of the tailing piles being built. The 6-in. steel pipe from the mill terminates in three 2-in. fire hoses which build up three sides simultaneously. This pile is in the truck-loading area. Tailings flow by gravity

Talk About PURRformance



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We recently made a survey among a large number of the many operators whose Seco vibrating screens have been on the job *at least ten years.* The results of this polling of on-the-job performance on all types of screening assignments point out *one* important Seco advantage that should interest every profit-minded operator. This is smooth performance . . . and it's no accident. It's the direct result of Seco engineering. Only Seco with the patented equalizer assembly has fully controlled true circular action. That's why Seco vibrating screens run smoothly year after year . . . and smooth running screens last longer, with less maintenance. There's no bobbing, weaving or excess strain on moving parts. Yes, after all it's performance that counts. And if you want the benefits of smooth, trouble-free screening on your job, it will pay you to investigate Seco now! Write, wire or phone.

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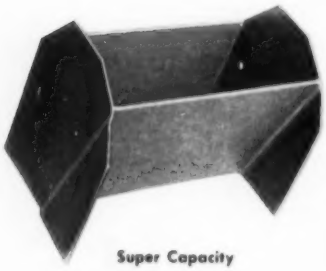

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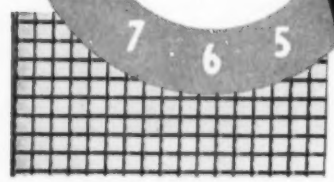

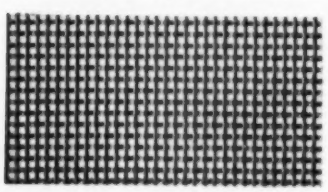

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THE CLEVELAND WIRE CLOTH & MFG. CO.

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Mexican Cements

(Continued from page 127)

hydration of gypsum as above explained, is very distressing in modern construction where the rapid placing of large concrete volumes requires uniformity and smoothness in operation; these are upset when mixes with initial slump of 2½ in., stiffen shortly, in some cases to almost zero slump.

In a large majority of cases false set can be easily avoided, with advantages not only at the construction site, but also at the cement mill.

When gypsum dehydrates in cement mills, at temperatures higher than 128 deg. C., water is adsorbed by clinker particles, balls are coated, and tonnage yield and fineness decreased.

A simple expedient to cool the mill (for example, by installing two 1-in. water lines, with ¼-in. perforations spaced 4 in., to sprinkle water on mill shell), will in many cases keep the temperature sufficiently low to prevent gypsum dehydration.

For all the above reasons, false set should be controlled. The majority of the Mexican cement plants have installed water lines over their finishing mills.

It is important not only to cool close to the dehydration temperature, but quite lower; otherwise reaction on free lime will raise the temperature in storage, and cement which entered the silo with no false set, will eventually acquire it.

A cement plant in the United States has changed to the addition of ground gypsum to the cement *after* it leaves the mill. According to reports from the field, difficulties with this cement have disappeared since this practice was started.

Alkali Content

For the Angostura Dam, on the Bavispe River, Mexico, (1937-1941), a gravity-arch structure, 300 ft. high, a limitation was set on the alkalis (Na_2O + 0.658 K_2O), not to exceed 0.8 percent (actually, cement delivered showed 0.7 percent).

Experience, as published in the very extensive United States literature, has shown that when reactive minerals (opal, chalcedony, silicious glass, etc.) are present in the aggregates, a lower alkali limit (0.60 percent) is desirable.

Even with no reactive aggregates, alkalis are no bargain: They obstruct satisfactory set, require more gypsum, produce stains and efflorescence, burn the workers skin, etc. Therefore, the Mexican portland-pozzolan cement specification limits the alkalis, in all cases, even if no reactive aggregates are present, to a maximum of 1.2 percent; but stipulates that when the buyer requires special cement, low in alkalis, they will not exceed 0.60 percent.

The purpose of formulating new and efficient specifications to cover various types of portland and port-

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WINSLOW,
OF COURSE

WHO SAID IT WOULDN'T WORK?

SEVERAL
COMPETITORS

WHO IS NOW FALLING INTO LINE?

THOSE SAME
COMPETITORS

WHO IS STILL THE NATURAL LEADER?

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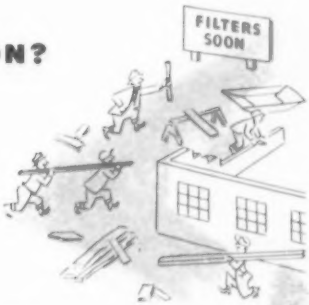

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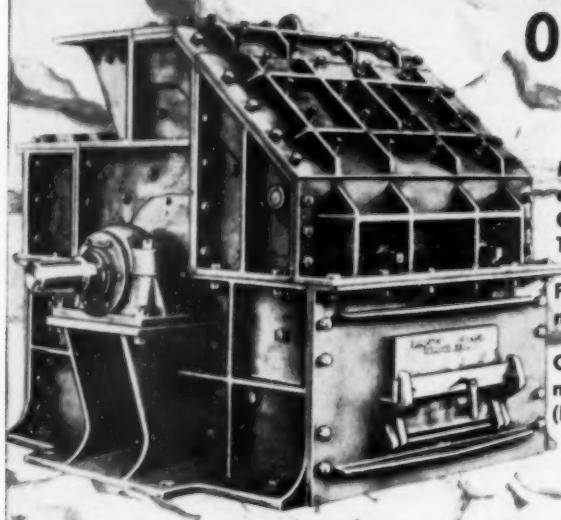

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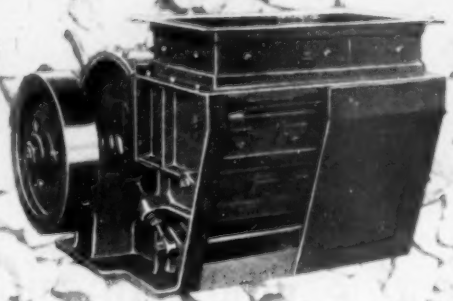
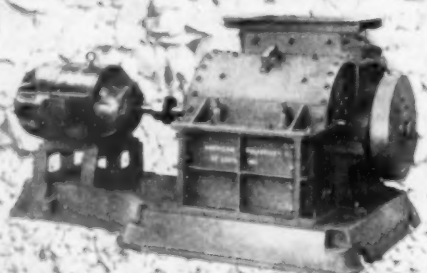


...from Roadstone to Agstone



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Labor Relations Trends

(Continued from page 95)

of the clause 6 (B) constitutes merely "an example" or illustration of a "work week" was not justified by the plain langauge of the clause. He placed particular emphasis on the wording "*the* work day and *the* work week," as referring specifically to a work week beginning at 8:00 A.M. Monday morning. He also emphasized that this was the only reference in the contract to the establishment of a work day and a work week.

The company's contention of the right to arrange working hours under Article 6 (C), the arbitrator ruled did not justify the company's contention (2). He said: "The word 'hours' as used in this section of the contract seems clearly to refer to the *number* of hours worked in a day or week and *not* to the 'determination' or 'establishment' of a work week. It would appear that the language 'the right to arrange working hours,' as used in Article 6 (C), refers to the 'arranging' of 'hours' within '*the* work week'—and '*the* work week' is spelled out elsewhere in the contract, in a provision drafted especially for that purpose. It would appear that Article 6 (C)'s meaning is to give the company the right to arrange the working hours in that it can schedule work, as conditions require, within 'the work day' or within 'the work week' (as 'established' and 'determined' in Article 6 (B)), subject to the requirement in Article 6 (A) that time worked in excess of eight hours in a day shall be paid for at 'time and one-half,' and subject to the F.L.S.A. provisions with reference to overtime pay for work in excess of 40 hours during the work week, provided that there shall be no pyramiding of daily and weekly overtime. It would appear, in short, that the language of Article 6 (C) does not modify the language of Article 6 (B). The arbitrator is not justified in concluding that the parties would spell out the metes and bounds of the 'work week' with precision in one article and then give the company the right to 'arrange' those same metes and bounds in the very next provision of the contract.

"The able company spokesman calls attention to the word 'any' in the second sentence of Article 6 (B), which reads, in part, as follows: 'However, for the purpose of computing the 6th and 7th consecutive days worked in *any* work week . . . ,' (Emphasis added). He contends that the use of 'any' indicates that the parties meant 'any' work week of seven consecutive days, and not just a seven-consecutive day week beginning on Monday. It would appear, when Article 6 (B) is considered in its entirety, that 'any' as used in its second sentence, refers to 'any' work week as 'established' and 'determined' in that section—that is, to 'any' work week beginning 'at 8:00 A.M. Monday

(Continued on page 198)

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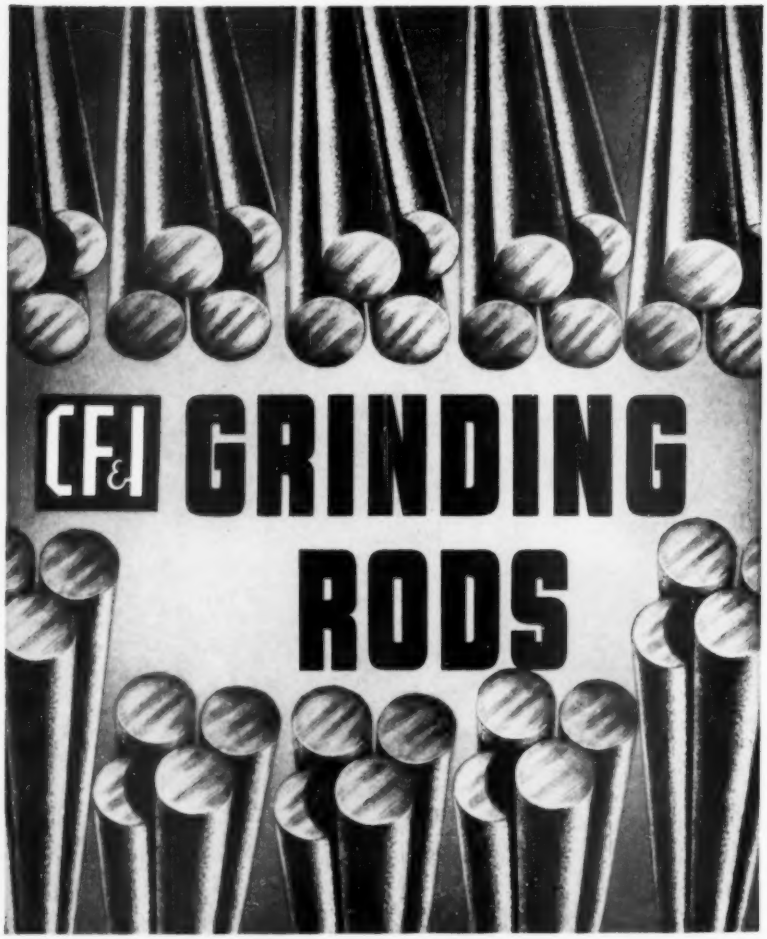

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GRINDING RODS
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1788

Labor Relations Trends

(Continued from page 196)

morning and consisting of seven consecutive 24-hour work days to the following Monday morning at 8:00 A.M.' For example, consider the work weeks of Monday, April 6 to Monday, April 12, 1953; and Monday, April 12 to Monday, April 20, 1953; and Monday, April 20 to Monday, April 27, 1953; and Monday, April 27 to Monday, May 4, 1953. The second sentence of Article 6 (B) would appear to provide that 'for the purpose of computing the 6th and 7th consecutive days worked' in 'any' of the four work weeks listed above, 'a day worked shall consist of eight (8) consecutive hours.' "

Finally, the arbitrator notes the frequent reference in the contract to "*the*" work week (emphasis added):

"Article 6 (A): Any work performed on the seventh consecutive day worked during *the* regularly scheduled work week . . . .

"Article 6 (B): For the purpose of establishing . . . *the* . . . work week . . . *The* work week shall begin at 8:00 A.M. Monday . . . .

"Article 6 (H): A holiday occurring during the first five days of *the* work week . . . ."

Side Agreement

Since September 23, 1949, there had been "a side agreement" between the union and the company in which it was stipulated that "all maintenance men (only), who have lost time during the week through no fault of their own, but have been laid (sic) off by the company in keeping with the regular scheduled work week of six days on maintenance, that hereafter, effective this date, and for the period of the agreement signed July 1, 1949, shall be paid at the rate of double-time for Sunday maintenance work performed on Sunday when the board plant operates. . . ." The agreement terminated with the contract, but was renewed and changed somewhat in the agreement made on July 1, 1950.

The new agreement read as follows: "In order to correct inequality (sic) hourly rates for Sunday maintenance, it is mutually agreed between [the same parties described above] that all employes who are classified or assigned to the maintenance department, and including yard truck drivers, who are regularly (sic) scheduled on a six-day work week including Sunday, shall be paid at the rate of double time for Sunday maintenance work performed while the board plant is operating. [If] the board plant is scheduled down, a minimum of eight (8) hours on Sunday, the regular rate of time-and-one-half shall apply between 8:00 A.M. and 4:30 P.M. Work required thereafter during Sunday scheduled operation to be paid at the rate of double time." It was further specifically stated that these provisions were not part of the

(Continued on page 200)

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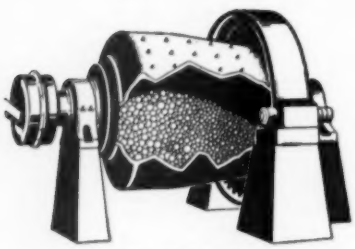
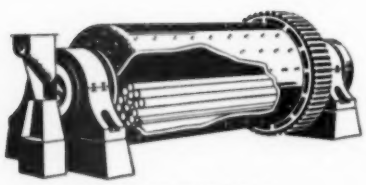
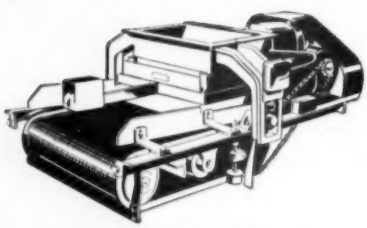


CONICAL AND TRICONE MILLS

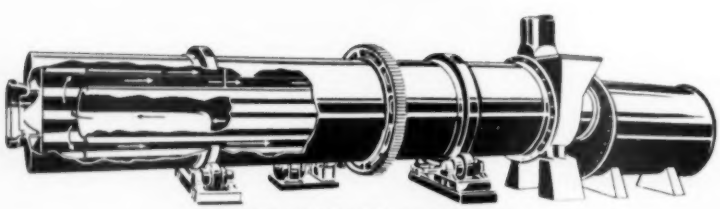
AIR CLASSIFYING SYSTEMS



ROD AND TUBE MILLS



CONSTANT-WEIGHT FEEDERS



ROTARY KILNS, DRYERS AND COOLERS

WRITE FOR COMPLETE LINE CATALOG NO. 100-A-7

HARDINGE
COMPANY, INCORPORATED

YORK, PENNSYLVANIA · 240 Arch St. · Main Office and Works

New York · Toronto · Chicago · Hibbing · Houston · Salt Lake City · San Francisco

main contract, but would terminate with the contract. The same agreement was renewed to cover the period July, 1951 to June 30, 1952.

Both the contract and the side agreement continued to govern while a new contract, signed January 5, 1953, was being negotiated. But this time the union did not sign a new side agreement. Accordingly, the arbitrator decided that since at each previous renewal of the side agreement it had been specifically stated that it was to expire with the expiration of the contract, the company's contention that it continued by established custom without a new agreement was not valid. The continuance of the 1951-1952 contract and the acceptance of the accompanying side agreement during the negotiating period of six months was not to be accepted as proof that the side agreement could continue indefinitely without its specific renewal, was the opinion of the arbitrator. The matter of whether the gypsum industry was or was not a seven-day continuous operation, the arbitrator considered irrelevant to this dispute.

Award

The arbitrator's award, in his own words, was as follows: "After the careful study of testimony and analysis of exhibits as submitted in evidence by the parties it is the award of the impartial arbitrator

"(1) that the collective bargaining contract establishes a single 'work week' for all employes in the bargaining unit, including maintenance employes;

"(2) that the 'work week' begins at '8:00 A.M. Monday morning' and consists of 'seven consecutive 24-hour work days to the following Monday morning at 8:00 A.M.;'

"(3) that such maintenance employes as would have been entitled, under the interpretation of the contract set forth above, to twice their regular rate of pay for work performed on Sunday as the 'seventh consecutive day worked,' shall be paid the difference between what they received for such Sunday work and twice their regular rate of pay, retroactive to January 5, 1953."

Canadian Asbestos Plant

DOMINION ASBESTOS MINES has started initial test runs of its new $2,000,000 asbestos milling plant at St. Adrian de Ham, Quebec. During the inaugural test period, capacity will be 2200 tons daily, which later will be increased to over 4000 tons daily.

Pressure Hydrated Lime

AS RECENTLY ANNOUNCED in *Limeographs*, Cape Lime Co., Ltd., has started production of a pressure hydrated dolomitic lime for the building trades at its Worcester, South Africa plant.

GM DIESEL
CASE HISTORY NO. 1A3-12

OWNER: Georgia Coating Clay Co., Macon, Ga.

INSTALLATION: Twelve GM Diesels power shovels, Koehring Dumptors, GMC Trucks stripping 97 feet of overburden and mining Kaolin.

PERFORMANCE: Equip. Supt. W. J. Herrington reports 6-71 powering Koehring 1½-yd. shovel (background) has worked 45 hours a week, 52 weeks a year for over 6 years--about 14,000 hours--without an overhaul. Newer ¾-yd. Lima (foreground), powered by a 3-71, has already operated for 3500 trouble-free hours.

It pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL POWER

14,000 HOURS
WITHOUT ENGINE OVERHAUL

Long engine life between overhauls is only one advantage you get with General Motors Diesel engines. Power on every piston downstroke makes a 2-cycle GM Diesel accelerate faster under load—gets more work done every hour. Simple, practical design cuts down time because it does away with such trouble sources as high pressure fuel lines. When service is needed, you'll find the cost surprisingly low. GM Diesel engines are easy to work on—simple to inspect and service. And comparison will show you that GM Diesel parts cost less.

You can get GM Diesel power in leading makes of shovels, tractors, hauling units, loaders, compressors and generators. A postcard will bring you a list of the 750 different models of equipment powered by General Motors Diesel engines.

DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

THERE'S AN
INSLEY
WORKING NEAR YOU

The Insley Line includes excavators and cranes, 5 to 30 ton capacity—rubber or crawler mounted —gasoline, diesel or electric powered. There's an Insley working near you.

INSLEY MANUFACTURING CORP. • INDIANAPOLIS

wholly owned subsidiaries

THE MAXI CORPORATION, LOS ANGELES • SIX WHEELS, INC., LOS ANGELES

Lehigh's Bunnell Plant

(Continued from page 149)

pose motors with an aggregate rating of 4000 hp. Power is distributed at 4160 volts to the various departments where unit substations are provided for transformation to lower voltages. Motors of 200 hp. and higher rating are supplied at 4160 volts and all smaller motors are driven by 440-volt current. Unit substations are provided for the screening and washing plant, the packhouse, the kiln building, office and laboratory, the raw mill and the finish mill department. Transformers for the two mill departments and all switchgear and controls for these two departments are located on panels in the central control room.

Also, in the central electrical control room are two 75 kw. motor-generator sets for excitation of the synchronous motors in the grinding mill and a 300-amp. arc welder for spotting the mills. Total peak power demand will be about 7000 kw.

As a safeguard against power failure a 300 kw. diesel-generator set is available to develop sufficient power for agitation of slurry and for thickener operation.

Material Handling

The Bunnell plant is a good example of the trend to the increasing use of labor-saving material handling and earth-moving equipment in cement manufacture. Among the equipment performing various and sometimes miscellaneous functions are:

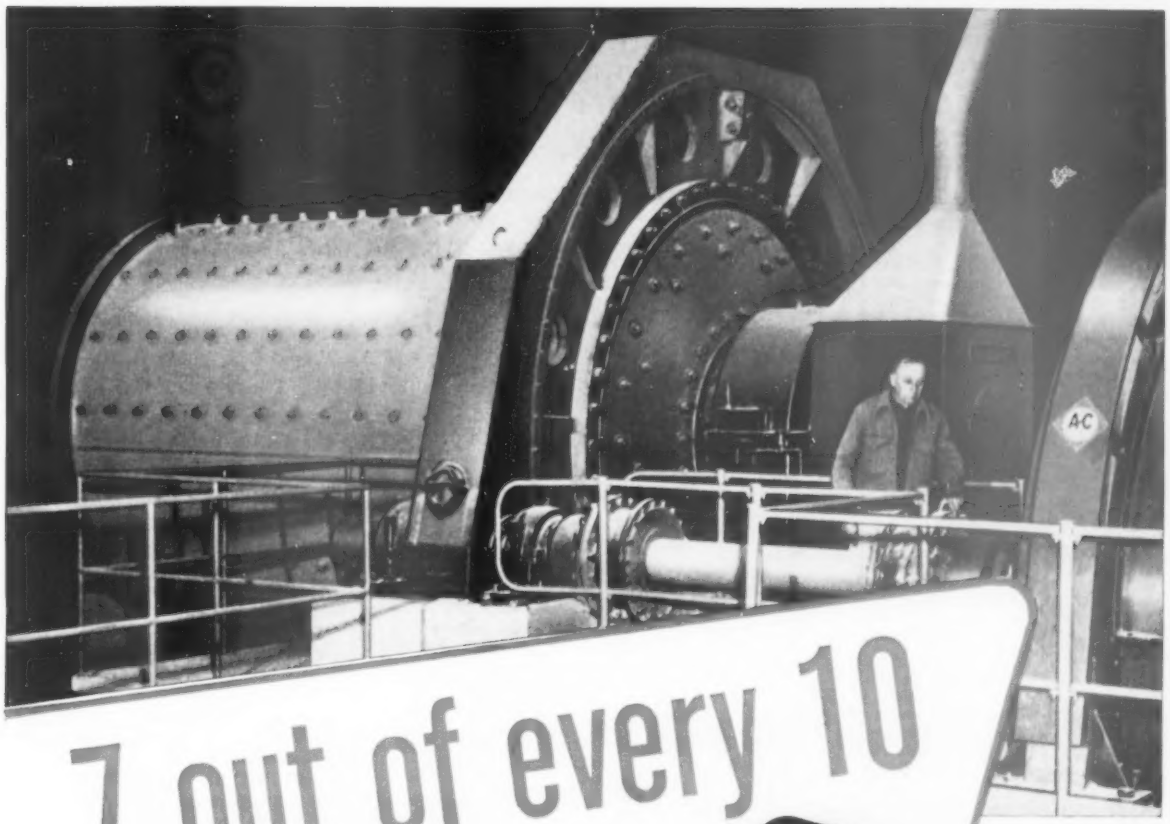
1. A Wright 5-ton overhead crane in the mill building for handling heavy parts and grinding media
2. A Whiting Trackmobile to spot railroad cars
3. Two D-8 Caterpillar bulldozers for stockpiling, maintenance of the working area, building dikes and trimming stockpiles
4. Adams roadscraper
5. LeTourneau Carryalls for levelling
6. Clark fork lift truck for handling palletized bags
7. Hyster 20 and Hyster 40 for transport of refractory brick on pallets
8. Hough Payloader for earth moving, cleanup and general utility work

Also, electric elevators are provided to carry men and materials to the top of the blending tanks and the cement silos.

Machine Shop

Bunnell is remote from any well-equipped machine shops so the plant has its own shops to perform many major repair jobs and general maintenance. It also carries a complete stock of parts. Equipment in the shop includes saws, grinders, shapers, impact wrenches, boring mill, drills and drill presses, jointers, threading machines, power shears, forcing press, forming rolls, tool grinders and cutters and lathes.

(Continued on page 204)



7 out of every 10

are repeat orders

ALLIS-CHALMERS GRINDING MILLS

OPERATING MEN who have had actual experience with Allis-Chalmers grinding mills will usually specify A-C mills again . . . as proved by our sales records.

Repeat orders, of course, come only from customers who have been well satisfied. That's why we're proud of the fact that 7 out of 10 new Allis-Chalmers grinding mills go to operators for whom we have supplied mills in the past.

Ask the Allis-Chalmers representative in your area about the many high output and low maintenance advantages of Allis-Chalmers grinding mills. Or write for Grinding Mill Bulletin 07B6718A. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3845

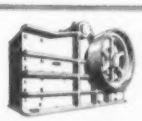
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills

Vibrating Screens



Jaw Crushers

Gyratory Crushers

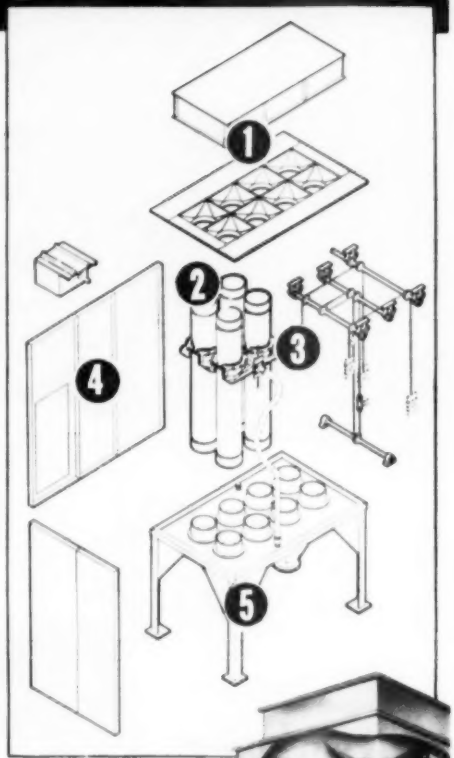
Grinding Mills

Kilns, Coolers, Dryers

here's why

AEROTURN Dust Collectors

will give you high volume air-cleaning



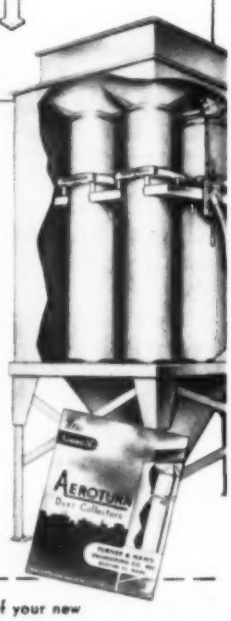
1 Dust and dirt-laden air enters plenum casing at top of the collector for equal distribution to filter bags.

2 12-inch diameter filter bags, made of tough, durable, pressed wool felts of ultra-high filtering efficiency, trap dust down to submicron size.

3 To prevent clogging of the filters, polished aluminum blow rings travelling up and down exterior of filter bags slightly indent the bags and blow a high-pressure, reverse-air-jet through the walls. Accumulated dirt on the inside of the filter bag is dislodged by impact of the jet.

4 Air cleaned of 99.9% or more of its dust and dirt can then be recirculated within the plant, or may be exhausted directly and safely into the community.

5 Dislodged dirt falls into the hoppers below the filter bags for disposal.



Whatever your dust problem, you'll find the Series 12 can do an effective and efficient dust collecting job in your plant. Satisfied users in many industries have found that their Aeroturns provide high cleaning efficiency with extremely low maintenance and occupy only ⅓ to ½ the space required by other dust collectors. They've also saved 50% to 75% in erection time and costs due to simplified assembly.

For further information about the Series 12 AEROTURN, write today for our new brochure just off the press.

TURNER & HAWS
Engineering Co., Inc.
87 Gardner Street
West Roxbury 32, Mass.

Please send me a copy of your new Series 12 AEROTURN brochure.

Name .....

Address .....

City ..... Zone .....

State .....

The laboratory is air-conditioned and has all the modern equipment for chemical analyses and testing. Workers' change rooms adjoin the machine shop and store room.

Personnel

Ten of the key supervisory and office and laboratory personnel came to Bunnell from other Lehigh plants but nearly all workers are Floridians, the majority of whom had had no previous experience in cement manufacture.

H. B. Burks, plant manager, was formerly plant manager at the Birmingham, Ala., mill. Assistant plant manager W. J. Klein came from Fordwick, Va. and assistant chemist Elmer C. Golrin was transferred from Mason City, Iowa. H. B. Burt is chemical engineer.

Officers

Roy N. Young is vice-president and operating manager of the company with headquarters at the executive offices in Allentown, Penn. P. A. Groll is vice-president and assistant manager for operations, and A. J. Johnson is assistant vice-president for operations. W. M. Harbaugh is chief engineer.

Joseph S. Young is president of the company and J. C. Bowen is executive vice-president.

Lehigh Portland Cement Co. started the manufacture of portland cement in 1898 at Ormrod, Penn., with an annual capacity of 200,000 bbl. With completion of the Bunnell plant, the company now has an annual capacity of 22,500,000 bbl. Mills are located at Alsen, N.Y.; Birmingham, Ala.; Buffalo, N.Y.; Bunnell, Fla.; Cleveland, Ohio; Fogelsville, Penn.; Fordwick, Va.; Iola, Kan.; Mason City, Iowa; Metaline Falls, Wash.; Mitchell, Ind.; Oglesby, Ill.; Ormrod, Penn.; Sandt's Eddy, Penn.; and Union Bridge, Md.

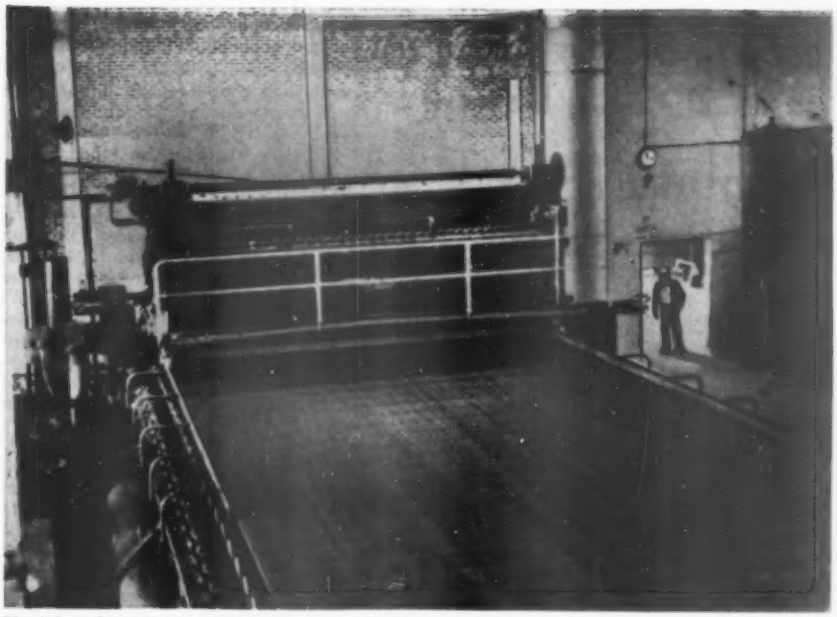
Bunnell is the only completely new mill built by the company since the Birmingham, Ala., plant was built in 1922-1923, but there have been major expansion programs and modernization at the various older mills over the years that have added substantially to total productive capacity. Since January, 1946, the company has spent $49,650,000 for modernization and expansion.

Gravel Plant

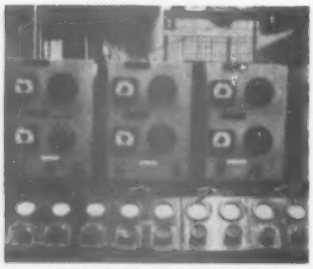
HENRY A. RAEMISCH Co., Middleton, Wis., recently began operations at a gravel deposit northeast of Westport, Wis. The deposit covers approximately 40 acres and extends about 40 ft. below the Yahara river bank.

Sand and Gravel Plant

LA GRANDE SAND AND GRAVEL Co. has started operation of its new plant at La Grande, Ore. C. D. Kelley, is owner and operator.



Block-long Fourdriniers sitting side by side turn out an endless strip of kraft 24 hours per day, 7 days per week, 365 days per year. At "wet end" above, kraft is 96% water, 4% pulp. Scene is at modern Florida mill where Hudson Multiwall Sacks are made.



Automatic controls safeguard every foot of kraft manufacture, to assure that your exacting specifications are fully met.

At "dry end" of Fourdrinier, water content has been reduced to proper 6%. Crane removes kraft for rewinding, slitting, and humidity-guarded storage.

Here is why HUDSON can guarantee Multiwall Sacks against breaking on your packer

REASON NUMBER 3 HUDSON MAKES ITS OWN KRAFT

Last year this Hudson mill made enough kraft to lay a 20-foot strip several times around the world. Hudson is a veteran of 31 years in kraft manufacture...but its Multiwall Sack mill is virtually new—with outstandingly advanced equipment.

By making its own kraft, Hudson exerts iron-clad control of Multiwall Sack quality and delivery schedules. This is another reason why Hudson guarantees to replace *without cost* all Hudson Multiwall Sacks that fail on your packing or closing machines.

HUDSON

MULTIWALL SACKS

the World's most fully GUARANTEED

SEND TODAY: How to store your sacks for maximum performance

Profusely illustrated folder shows you the scientific way to store your sacks. Step by step procedures that improve the performance of your sacks by up-to-minute storage methods. No obligation.

MAIL THIS COUPON NOW to Hudson Pulp & Paper Corp., Dept. 116, 505 Park Ave., New York 22, for literature and full information.

NAME _____

COMPANY _____

STREET _____

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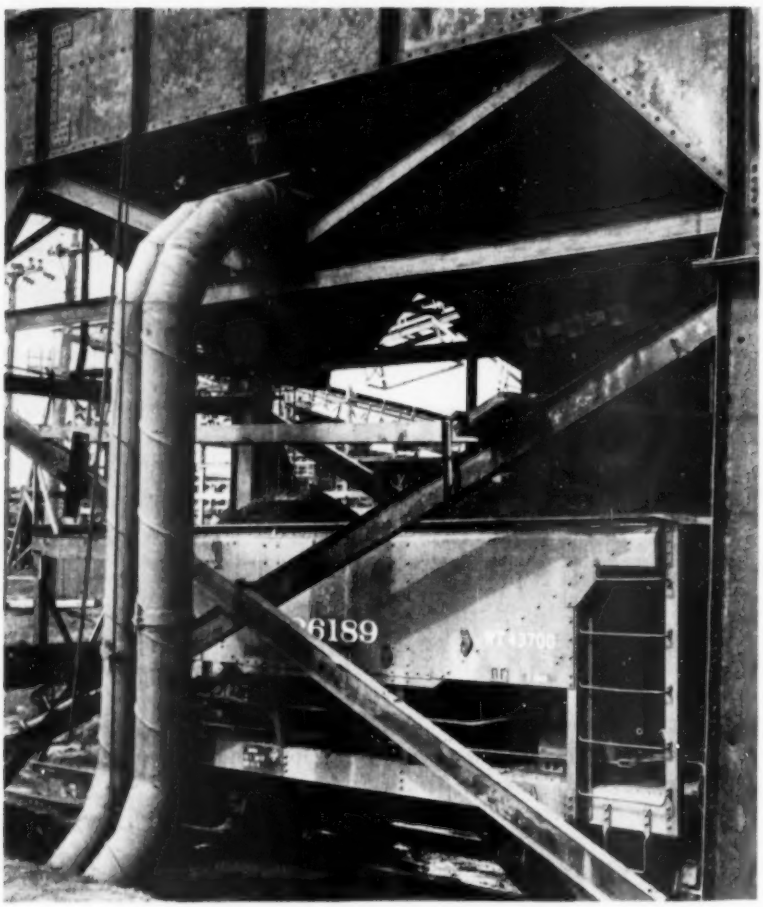
HUDSON PULP & PAPER CORP., Dept. 16, 505 Park Avenue, New York 22, N.Y.

NAYLOR PIPE...

Gets around wherever you need it



You can always depend on this distinctive, extra-strong lightweight pipe to carry the load. That's why you see so much of it on the job in mining service—whether it's for tailings, water supply or high and low-pressure air. Bulletin No. 507 will give you the details.

NAYLOR PIPE COMPANY
1237 East 92nd Street, Chicago 19, Illinois
New York Office: 350 Madison Avenue, New York 17, New York

Crushed Stone Meeting

(Continued from page 180)

director and president. The usual resolutions were adopted thanking the club management and Mr. Harstone for the splendid way the group was taken care of and entertained.

Manufacturers' Committee

On June 15, the executive committee of the Manufacturers' Division met. Present were Irwin F. Deister, chairman, and all the members of the committee—L. A. Eiben, Wayne W. King, B. R. Maloney, J. Craig McLanahan, and H. C. Krause, president of the association. The discussion concerned mainly plans for the next exhibit to be held in connection with the 1954 convention in February at the Conrad Hilton Hotel in Chicago. As, of course is generally known, the Manufacturers' Division of the N.C.S.A. is firmly attached to hotel exhibits, and probably would be unwilling to join in a larger show with other groups which might require that the exhibit be held in an auditorium separated from such hotel facilities as the association requires in any event.

Registration

In addition to the staff of the association already mentioned by name, and the members of the executive committee of the Manufacturers' Division, the following directors were present: C. H. Krause, St. Louis, Mo., president and chairman; G. A. Austin, Decatur, Ga.; L. J. Boxley, Roanoke, Va.; J. Reid Callanan, South Bethlehem, N.Y.; Bruce S. Campbell, Towson, Md.; W. N. Carter, Joliet, Ill.; H. A. Clark, Chicago, Ill.; T. C. Cooke, Swampscott, Mass.; Arthur F. Eggleston, Meriden, Conn.; Wilson P. Foss, III, New York City; Arthur Goff, Bay Port, Mich.; Otho M. Graves, Easton, Penn.; R. G. L. Harstone, Hamilton, Ont.; M. E. McLean, East St. Louis, Ill.; A. W. McThenia, Fort Spring, W. Va.; S. P. Moore, Cedar Rapids, Ia.; John H. Odenbach, Rochester, N.Y.; J. V. Owens, Utica, N.Y.; H. E. Rainer, Buffalo, N.Y.; Russell Rarey, Columbus, Ohio; R. S. Reigeluth, New Haven, Conn.; Warren C. Rowe, Malden, Mass.; James Savage, Buffalo, N.Y.; F. B. Thacher, Lowellville, Ohio; W. S. Weston, Jr., Columbia, S.C.; D. L. Williams, Ripplemead, Va.; W. F. Wise, Dallas, Tex.; Bruce G. Woolpert, Watsonville, Calif.; Sterling Tomkins, honorary member, New York City, and the following representatives of the Manufacturers' Division: Irwin F. Deister, Fort Wayne, Ind.; J. Craig McLanahan, Hollidaysburg, Penn.; and Wayne W. King, Cleveland, Ohio.

Magnesium Plant

Pacific Northwest Alloys, Inc., has leased most of the federal government's Spokane, Wash., magnesium plant for the production of ferroalloys, as recently announced by the General Services Administration.

THE ONLY MODERN FRONT END ... ON QUARRY SHOVELS

110-B, 4½ cu. yd.
150-B, 6 cu. yd.
190-B, 8 cu. yd.

Convertible Shovels — Draglines

THE new Bucyrus-Erie Ward Leonard electric shovels bring to quarry loading the first important departure from the old-fashioned shovel front end. This advanced design — with two-section boom, inside tubular handle, and quiet positive rope crowd — increases speed and payload. It reduces upper boom weight, puts extra strength in the lower section where maximum strength is needed. It cuts out old-style handle racking and crowd pinions, takes the deadweight of crowd machinery off the boom. And, most important to *you*, it gives you all these field-proven performance advantages:

- **Lighter Weight, Greater Strength** — Two-section boom, with light upper section . . . lower section strut-connected to the A-frame.
- **No Handle Twist** — Inside tubular dipper handle is free to rotate in rubber-cushioned saddle block.
- **No Handle Binding in Saddle Block** — Rope crowd is quiet, positive, eliminates handle racking and crowd pinions.
- **No Dipper Wobble** — Twin dual hoist ropes put hoist power where needed for steady travel of dipper through bank.
- **No Sway Braces** — Widespread boom feet eliminate accessory boom braces or cables.
- **Low Swing Loads** — Advanced front end design, with crowd machinery on deck, cuts dead load on swing, steps up swing speed.
- **High Pay Loads** — Single tubular handle — with improved dipper back connections, dipper trip on saddle block, no dipper bail — reduces dead load on hoist, leaves more power for digging.

7115-31C

There's much more to the story, too. Deck machinery, electrical equipment, and mounting all match the front end in advanced engineering and outstanding performance advantages. The full story will convince you that yard for yard, dollar for dollar, pound for pound, these are the finest rock excavators ever built.

Write for Complete Information Today!

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY SOUTH MILWAUKEE, WISCONSIN

9 Ways to reduce your refractory waste

Plibrico materials, construction methods and engineering skill combine to offer you *nine* easy ways to get the most out of refractory linings. Here's how Plibrico services can help solve refractory problems in dust chambers, tail rings, firing hoods, clinker coolers, flues, breechings, waste-heat boilers, stacks:

1. Through monolithic refractories . . . that eliminate countless troublesome joints.
2. Through rock-steady anchorage . . . which prevents bulging and collapse.
3. Through minimized maintenance . . . longer life means fewer repairs.
4. Through reduced inventories . . . no special shapes needed . . . Plibrico stocks close at hand.
5. Through resisting abrasion damage . . . by selection of the right refractory material for the job.
6. Through uniform product quality . . . assured by constant laboratory control.
7. Through creative engineering . . . which overcomes specific job problems.
8. Through skilled installation . . . matched to the quality of the refractory itself.
9. Through complete service . . . that avoids the hazards of divided responsibility.

For detailed explanation of these nine money-saving Plibrico advantages, write or call us for our booklet "9 Ways to Reduce Your Waste." We'll send it by return mail.

Plibrico Company

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PLIBRICO SALES & SERVICE IN PRINCIPAL CITIES

REFRACTORY PRODUCTS • ENGINEERING • CONSTRUCTION

Research

(Continued from page 176)

sidered not actually chemically bound. However, colloid chemists attempt to differentiate between adsorbed water which is more or less mechanically or physically bound, and water which is "chemisorbed," where some chemical attractive force appears to be also involved. Probably in the cases cited, lime putty and silica gel, both kinds of adsorption come into play. There is still another way in which water occurs and is retained in a solid, and this is the case of hydrates, in which the water molecules themselves form part of the crystal structure. The central ion is here surrounded or coördinated with four, six or more water molecules, which are polarized, or pointed toward the central ion, and held probably by electrostatic bonds, as in the case of the hydroxyl ions.

In such instances the water may be removed as water by heating or drying out, but when this is done the crystal structure collapses, as in the case of the hydroxides. The difference between the two can be distinguished by X-ray analysis from the distances separating the O ions and inferences regarding the position and function of the H ions, which can not be located, as already mention, by any present experimental methods. An example of this kind of a hydrate is gypsum, composed of a layer structure in which the layers are bonded together by H_2O molecules. Each water molecule is joined to a Ca^{+2} ion and to the O of a sulphate $(SO_4)^{-2}$ ion and to another O of an adjacent layer of $(SO_4)^{-2}$ ions.

Then there are hydrates in which the crystal structure is sufficiently rigid, or independent enough, that the water molecules merely fill gaps or holes in the lattice structure, and can be driven out without affecting the lattice, with the possible exception of shrinking it, by drawing the particles or crystals closer together. Silica and alumina gels are probably to be classed as this kind of a hydrate. When the interior pores of such a hydrate are inter-connected so as to form channels large enough for the water molecules to pass through, we have the zeolites (silicates) which can be saturated and dryed out indefinitely without change of structure in any way.

Cement Gels

In dealing with portland cement gels or pastes we are probably dealing with silica and alumina gels, or a mixture of the two, with the additional complication that hydrated lime (or calcium hydroxide) is also present, both separately and combined in some form with the silica and alumina gels, in what are termed hydrated calcium silicates and aluminates. Thus, we would expect the water to be differently combined or adsorbed in the two or three different essential

NEW, Power-Packed AND READY TO GO!

NEW U-1091 natural gas power unit develops 187 net h.p. at 1400 rated r.p.m.; 200 net h.p. at 1600 max. r.p.m.; maximum torque, 820 lbs. ft. @ 800 r.p.m.

NEW U-450—102 net horsepower at 1800 rated r.p.m.; 110 @ 2200 r.p.m.; maximum torque, 324 lbs. ft. @ 1200 r.p.m.

NEW U-406—91 net horsepower at 1800 rated r.p.m.; 98 @ 2200 r.p.m.; maximum torque, 279 lbs. ft. @ 1200 r.p.m.

NEW U-372—83 net horsepower at 1800 rated r.p.m.; 91.5 @ 2200 r.p.m.; maximum torque, 263 lbs. ft. @ 1200 r.p.m.

NEW U-269—62 net horsepower at 1800 rated r.p.m.; 72 @ 2400 r.p.m.; maximum torque, 191 lbs. ft. @ 1200 r.p.m.

NEW U-240—55 net horsepower at 1800 rated r.p.m.; 64 @ 2400 r.p.m.; maximum torque, 168 lbs. ft. @ 1200 r.p.m.

NEW U-220—50.5 net horsepower at 1800 rated r.p.m; 62 @ 2400 r.p.m.; maximum torque, 151 lbs. ft. @ 1200 r.p.m.

IH Announces Seven New International Engines

Seven new six-cylinder, carbureted, valve-in-head engines have been added to the International line, which now includes 18 models—diesel, gasoline or gas—ranging from 16.5 to 200 net horsepower.

These new models are the result of more than 45 years of IH engineering and manufacturing experience building a complete line of heavy duty engines for tractors, trucks, construction and oil field equipment and individual power unit applications.

These new units have the durability, flexibility and economy to meet your requirements for lower cost performance. The unmatched network of IH district offices, parts depots, distributors and dealers puts complete service facilities practically at your door.

If you are an individual user of engines, it will pay you to see your nearest International Industrial Distributor or Power Unit Dealer for more complete information. If you are a manufacturer, your nearest IH district office will be glad to help you engineer these engines into the equipment you are building.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

POWER THAT PAYS

INTERNATIONAL HARVESTER

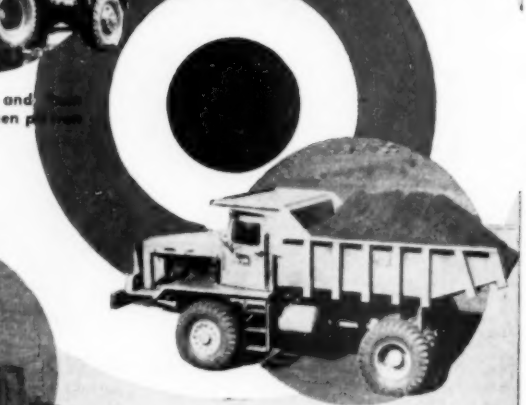
INTERNATIONAL

RUGGED and TOUGH

. . . of course . . . they're built by HEIL

12-yd. Heil Rock Body and Telescopic Hoist used in open pit iron mine hauling.

15-yd. Heil H-60 Rock Body with telescopic hoists. Heil bodies can be individually engineered to your requirements for body length and load distribution.



Heil 15-yd. H-60 Rock Body with 70° double-acting hoist in operation on the Mesabi. Heater arrangement in floor utilizes heat of exhaust to prevent ore freezing to body.

RUGGED, rock-ready construction . . . that's just one of the Heil Rock Body features that hits the bull's eye every time for profitable operation on the toughest jobs. Heil Rock Bodies are fabricated of ¼" (or heavier) steel plate, with box-member ribs providing rigid reinforcing for maximum strength. Floor has a 2" hardwood cushion sandwiched between body bottom and wearing plate to absorb the shock of loading with big buckets. Subframe construction with both cross members and long members interlocked and welded into a single assembly prevents sagging of the body floor.

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Remember, when your dump body is Heil-built, it's well-built! It stays on the job and out of the shop. It withstands the daily punishment of heavy loads . . . and comes back for more, year after year. Your Heil distributor can give you the facts about *all* Heil features. See him today!

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8H-8

HEILINER 13 AND 18-CU. YD. SCRAPERS

HEILINER 20-CU. YD. BOTTOM DUMP WAGON

CABLE POWER CONTROL UNITS

components. If the hydrated calcium silicate, for example, is considered an entity, we have the problem so admirably expounded by T. C. Powers and T. L. Brownyard in their P.C.A. Bulletin 22, "Studies of the Physical Properties of Hardened Cement Paste," of trying to distinguish between *evaporable* and *nonevaporable* water. This is a subject we will go into in more detail in a subsequent issue, for we have by no means exhausted the subject of water in cement and concrete.

(To be continued)

A.S.T.M. Meeting

(Continued from page 187)

ratory test procedures for sulfate resistance would be a worthwhile advancement.

"Wear Tests of Concrete" were discussed in a paper by H. L. Kennedy and M. E. Prior of the Dewey and Almy Chemical Co. The authors pointed out that the increasing use of air-entrained concrete for all purposes raised questions about its ability to resist abrasion. They grouped the different types of wear to which concrete may be subjected into four general categories and described the method of test best suited for evaluating the different types. These methods included the use of a revolving disc with and without an abrasive, the dressing wheel, the shot blast type of test, abrasive wheels, rattlers, and rolling balls.

Important factors in abrasion resistance of concretes made with the same materials are surface condition, bleeding, air-entrainment and duration of curing. Resistance of concrete to abrasion is proportional to compressive strength except when special hardeners are applied to the concrete. According to the authors no one method of test can be used to measure the abrasive resistance of all types of concrete.

"Pulse Velocity Testing of Concrete" was discussed in the paper by W. E. Parker of The Hydro-Electric Power Commission of Ontario. The paper described the various uses of the "soniscope" in testing concrete, particularly its use in testing mass concrete in dams for interior cracking, for depth of surface cracks, in determining the setting of concrete, and in laboratory freezing and thawing tests of concrete.

The last paper on the program of the Tuesday evening session was by C. E. Proudley, chief materials engineer, North Carolina State Highway and Public Works Commission. In this paper, which dealt with the "Evaluation of Curing Compounds for Portland Cement Concrete," the author listed the following as the desirable characteristics of curing compounds for use on highways and structures:

(1) Impermeability
(2) Sprayability
(3) Quick drying
(4) Non-injurious to concrete

(Continued on page 212)

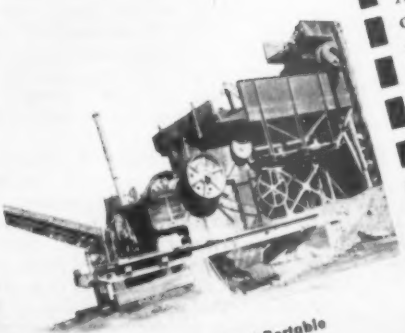
the shoe fits...

so DIAMOND'S wearing it!

DIAMOND, chosen again, crushes aggregate for the "Main Street of Southwest Virginia"

A Diamond #24 Semi-Portable Primary Crushing Plant was called on to crush the aggregate for U.S. Route 11, completing another section of four-lane divided roadway and closing one more inter-city gap north of Lexington. Diamond was a "natural" choice to work on the 340 mile strip, second longest and busiest highway in Virginia. The really tough jobs *always* go to Diamond.

Skid-mounted, Diamond's #24 carries a 24" x 36" Jaw Crusher; 3' x 10' Apron Feeder; and a laminated steel and oak lined folding hopper. Power unit is International Diesel. A 30" Wide Diamond Conveyor carries the aggregate away from the Crushing Plant to a screening plant located on top of a set of bins.



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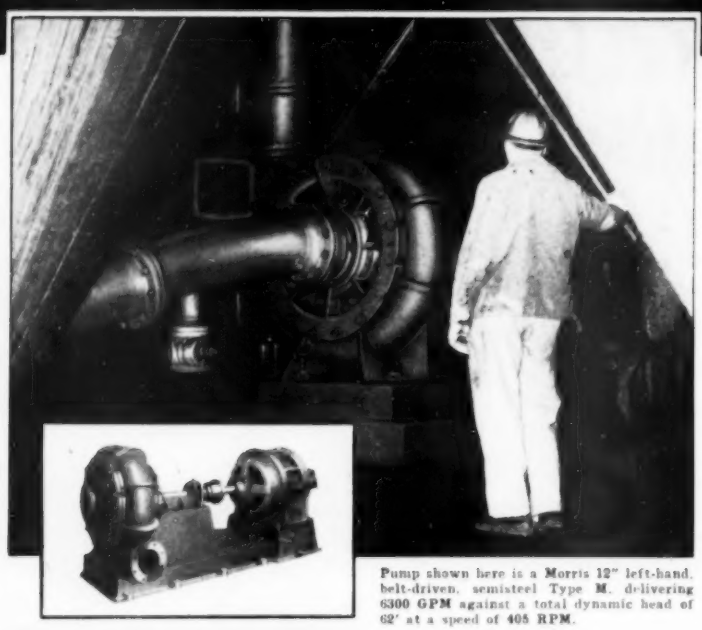
. . . for overall economy in delivering circulating water



Pump shown here is a Morris 12" left-hand, belt-driven, semisteel Type M, delivering 6300 GPM against a total dynamic head of 62' at a speed of 405 RPM.

MORRIS Type M Pump

The small high-speed pumps commonly used for circulating water are highly efficient—*if the water is relatively free of fine abrasive materials.*

When abrasive-laden water is carried, the high speed of these pumps accelerates the grinding action of gritty particles. Sealing rings are quickly cut and scored . . . the thinner casting sections break down rapidly—normal life expectancy is halved, frequently quartered.

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Where total heads do not exceed 120 feet, the larger, low-speed Morris type M Pump is more efficient for handling circulating water containing abrasive solids. Even the occasional big "tramp" piece—always a threat to the small pump installation—goes through the Morris without trouble. Depending on the pump size and total head, speeds range from a low of 188 RPM to a high of 1119 RPM.

Wearing parts are double the thickness of conventional clear water pumps. With economical upkeep a primary consideration in the design, sections subjected to most wear have been subdivided so that the greatest erosion bears upon smaller, less expensive parts. Optional use of special corrosion-and-abrasive-resistant alloys further increases the inherent long life on the Morris Type M.

Morris Engineers have been building pumps for all types of service for 88 years. Let them consult with you on your pumping problems. No cost. No obligation. Or, send for free Bulletin 175.

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MORRIS *Centrifugal Pumps*

(5) Reflect radiant heat

(6) Easily removed from concrete after curing period

(7) Safe both as to inflamability and toxicity.

Concrete and Report Session

At the concrete and report session Wednesday afternooon July 1, five papers dealing with masonry mortar and methods of testing concrete were presented. Also presented at this session was one paper on "Design Methods for Asphaltic Paving Mixtures."

During this session the Sanford E. Thompson Award, for a paper of outstanding merit on concrete and concrete aggregates presented before the society, was made to Mrs. Katharine Mather, Waterways Experiment Station, Corps of Engineers for her paper entitled "Application of Light Microscopy in Concrete Research" which was presented at the 1952 annual meeting.

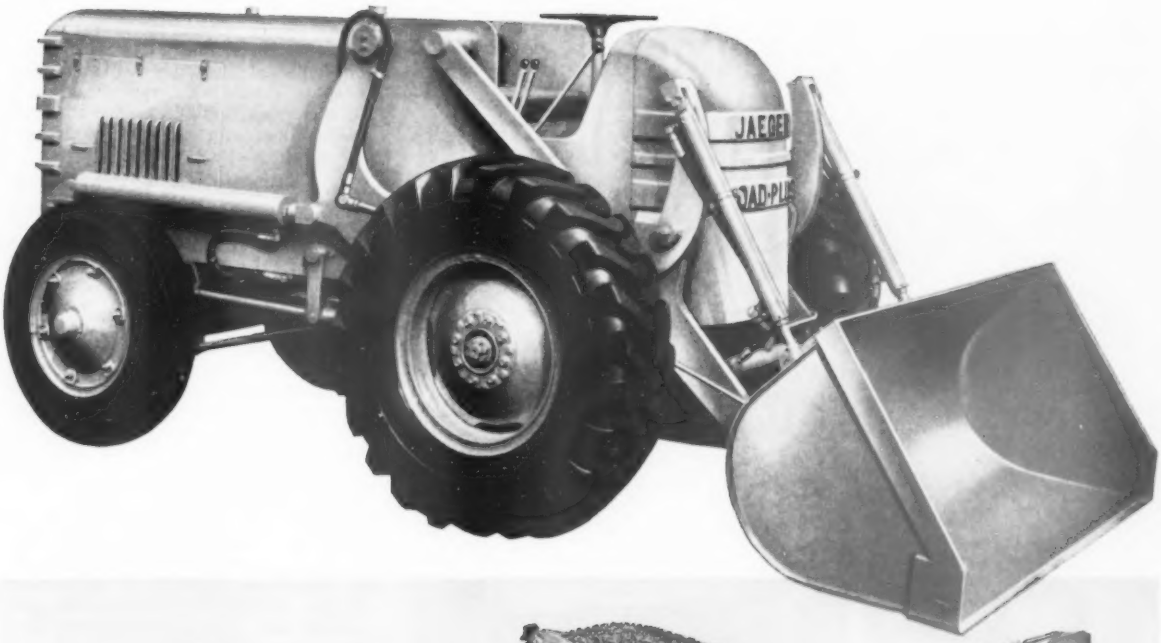
In a paper on "Some Effects of the Grading of Sand on Masonry Mortars," C. C. Connor of the New Jersey Bell Telephone Co. presented results of tests of 22 masonry sands on the workability of high-lime mortar mixes and the influence of 13 of the sands upon the amount of cracking that occurred between the mortar and brick in existing buildings. His studies indicated that to produce highly workable mortars the sand should contain progressively increasing amounts of the various sieve fractions from coarse to fine up to and including the No. 30 to 50 sieve fraction. Less than 25 percent should be retained on the No. 16 sieve, and less than 50 percent on the No. 30 sieve, and there should not be an excessive amount of material passing the No. 50 sieve.

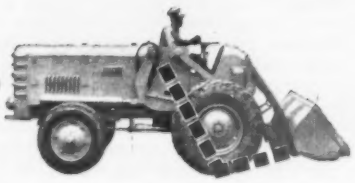
Although the percentage of mortar joint cracking varied widely, it was consistently low where the sand produced highly workable mortars and contained less than 25 percent of material passing the No. 50 sieve.

The author suggested tentative grading requirements for masonry sands which are based on the percentage of material in the various sieve fractions and on limitations in certain of the fractional sizes. The suggested requirements are considered to provide an improved method of judging the suitability of sands for masonry mortar.

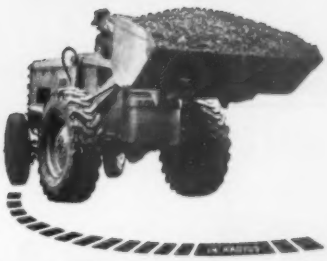
A paper by Leonard J. Mitchell, materials engineer of the Bureau of Reclamation was presented on "Thermal Expansion Tests on Aggregates, Neat Cements and Concretes." The tests were made in a study of the thermal characteristics of aggregates and the possible effects of incompatability between cement mortar and aggregates on the durability of concrete. Data on the thermal coefficients of 60 rocks representing 21 different mineral aggregates were reported.

The effect of age, moisture content, fineness and chemical composition of cement on the thermal expansion of

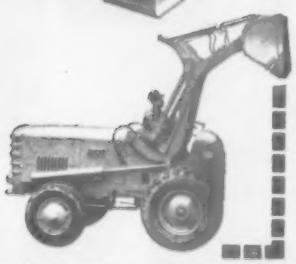




All weight centers on driven front wheels for maximum traction. Torque converter automatically applies power needed to meet the load.



Power-steered rear axle turns unit in 14' radius. 5 speeds to 28.2 mph reverse, 18.7 forward.



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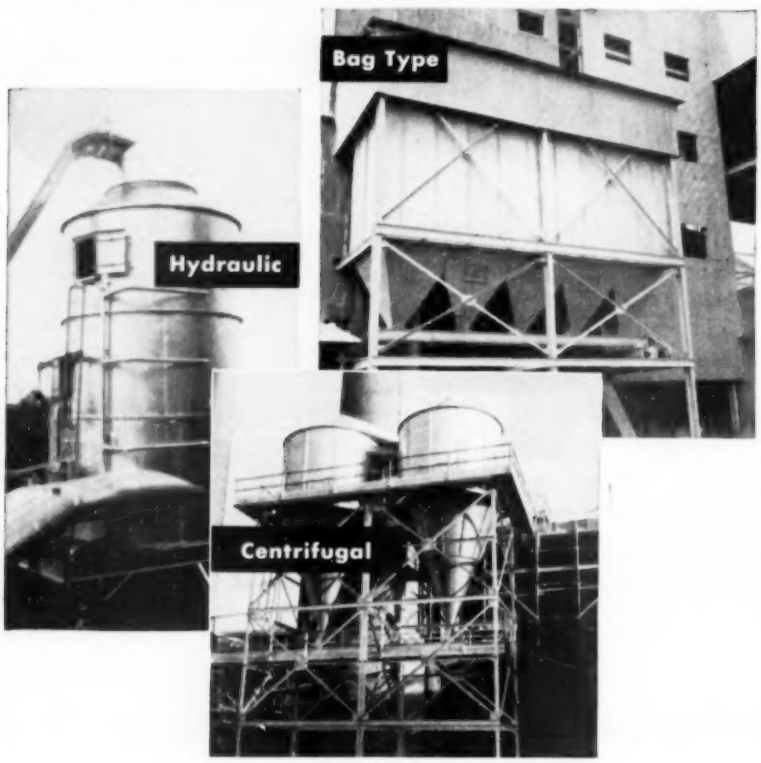

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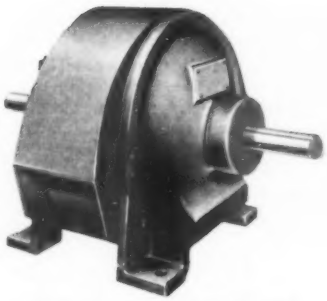
continuously moist-cured neat specimens was determined. The thermal coefficients of vacuum-saturated and oven-dried neat cement specimens, and of concretes and mortars containing "controlled" aggregate minerals also were determined.

The author found that similar rocks from different sources may have totally dissimilar coefficients of expansion. The principal factor contributing to the thermal coefficient of neat cement is moisture content; an optimum moisture content produces a maximum thermal coefficient. A specimen above a critical degree of saturation will expand excessively upon a single freezing and break apart in a very few cycles. Durability and thermal coefficient of expansion are both affected by the ease with which concrete becomes saturated and the degree of actual saturation.

In the paper entitled "Prediction of Concrete Durability from Thermal Tests of Aggregate," the authors E. C. Higginson and D. G. Kretsinger of the Bureau of Reclamation presented data on the effect of freezing and thawing, wetting and drying, and other simulated weathering tests on various concretes containing natural aggregate or aggregate composed of individual rocks and minerals. The tests were made to investigate the hypothesis that a differential in thermal coefficient of expansion between the fine and coarse aggregate, or between the paste or mortar and the coarse aggregate will result in deterioration of the concrete containing such aggregates. The effect of thermal coefficient and diffusivity of the aggregates on the deterioration occurring during the tests was studied but no correlation was found between the test results and the thermal properties of the materials. However, evidence was presented showing that the expansion occurring in saturated concrete during measurement of the thermal coefficient of expansion can be correlated with the results of freezing and thawing tests, thus providing a quick method of predicting durability.

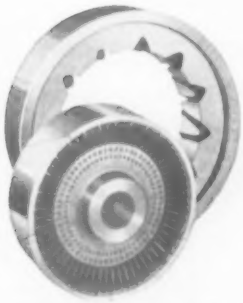
A report of an investigation at the University of Illinois by Clyde E. Kesler and Yoshiro Higuchi, entitled "Determination of Compressive Strength of Concrete by Using Sonic Properties" was presented by Prof. Kesler. The tests reported were made to determine what sonic properties of concrete, if any, would enable one to predict accurately the compressive strength of concrete.

"Comparison of Dynamic Methods of Testing Concretes Subjected to Freezing and Thawing," by G. M. Batchelder and D. W. Lewis was the title of the last paper on concrete presented at the concrete and report session. This paper, presented by Prof. Lewis, compared the results of resonant frequency and pulse velocity (soniscope) tests made on concrete mixes of varying durability when subjected to freezing and thawing.

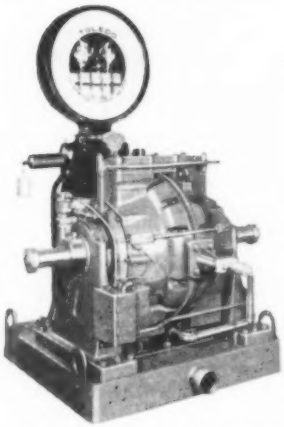


AIR COOLED COUPLINGS

AJUSTO-SPEDE MOTORS



AIR COOLED BRAKES



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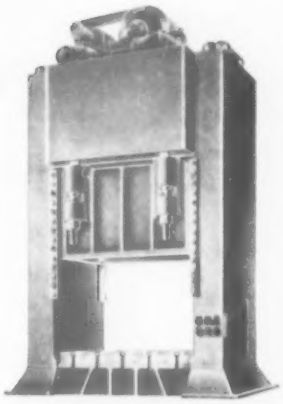
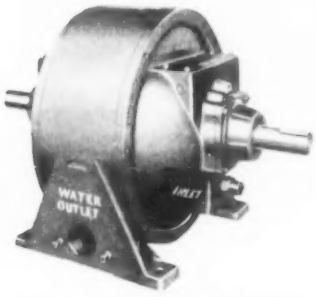
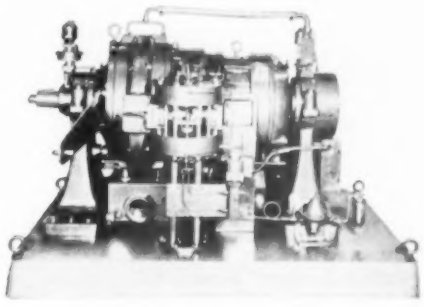


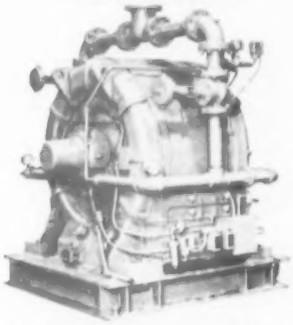
PRESS DRIVES



LIQUID COOLED COUPLINGS



UNIVERSAL DYNAMOMETERS



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Dynamatic Eddy-Current electro-magnetic equipment represents the ideal solution for a wide range of adjustable-speed drive problems, particularly where an AC power source is a requirement. Typical applications include paper machine drives, cement mill drives, industrial truck clutches, press drives, crane brakes, fan drives—in fact, practically all test, processing, and conveying equipment common to industry. Instantaneous response and accurate control are important advantages.

Write for your copy of Bulletin GB-1 which describes and illustrates the basic Dynamatic units.

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Using oyster shell from Mobile Bay and clay from the company's own deposit at West Baton Rouge, La., Ideal Cement's portland cement mill produces 6,000 barrels of cement per day. The clay, dumped by trucks into a soaking pit, is moved to the wash mill by a 2-cu. yd. Sauerman Scraper. Because of the nature of the material, the Crescent scraper bucket must be able to move freely from side to side of the pit in order to do a good job. This is accomplished by attaching the scraper cables to a monorail-trolley system at the front and rear of the soaking pit. The scraper handles 40 tons of clay per hour with a smoothness and economy of labor that further increases the overall efficiency of this mill.

Savings in labor costs, economy of operation, and rapid hauling are just three of the advantages provided by Sauerman Drag Scrapers. One machine — one man — efficiently controls the entire operation. Sauerman Scrapers have proved themselves in hundreds of applications all over the world. Better performance, less wear and maintenance mean more profits for you. Your inquiries are invited on a size and type Sauerman machine to suit your needs. Buckets range from ⅓ to 15 cubic yards. Gasoline, diesel, or electric powered.

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SAUERMAN BROS., INC.

ROCK PRODUCTS

The

"HOW TO DO IT"

MAGAZINE

Kiln Loading

(Continued from page 129)

may be dropped. In practice, a kiln is operated until the scale builds up so high that the charge is backed up over the feed end nose ring, or until the draft of the kiln is undesirably affected.

The narrow dam is of interest. I must reduce this to rather simple conclusions, for the mathematics is too abstruse for a practical interpretation. Also I feel it is too uncertain to rely on the results. If any operator wishes to consider the installation of special construction in his kiln, the only safe method is to make a model kiln and try it out with the desired load or feed per kiln revolution.

Certain conclusions may be stated as follows:

1. A narrow dam (placed up the kiln) that is lower than the normal depth will cause no retardation of the rate of flow. This statement is modified by the maximum size of the feed. A depth of one thickness of the maximum particle is necessary to pass the charge. If the normal depth is 15 in., and the maximum piece is 2 in., then a dam of 13 in. begins to have an effect. A 15-in. dam would have a very minor effect.

2. A narrow dam at the discharge has an effect only in the relationship of its height to the "dropping off" profile. For this effect, see Chart 3.

3. A long dam, that is, one that is at least five times its opening, is the equivalent of a smaller kiln in which the rate of travel is slower, the segment of the bed larger and the depth much greater. Even if it has a radial height less than the normal depth, it will have a considerable damming up effect. This can be figured theoretically but is more properly tried out in a model kiln. No case is known where such a long constriction has been placed in a kiln with refractory. The condition does occur with a long scale ring.

Extent of Effect of Damming

Apparently no work was done to determine how far the effect of damming extends up the kiln. If a dam is higher than the normal depth of bed, a pool of the charge is built up above the dam. The surface of this pool is not level (in the rolling plain of the charge) but is at a lesser slope than that of the kiln. Hence at some point further up the kiln, the surface of the pool meets the normal bed. No information was given on the slope of the surface of such a pool nor how far it extends until the normal depth is reached. Presumably this work was not done which is unfortunate since the information would be valuable.

But it must be reiterated that when it comes to introducing specialized construction in the upper sections of a kiln, it is safer to discard all theories and formulas, and try it out in a model. *(Continued in a later issue)*

Here are the BENEFITS of BENEFICIATION by Flotation

BROADEN YOUR PRODUCTION
REVIVE YOUR QUARRY

Depending upon the composition of your "run-of-quarry" stone, the Flotation Process may enable you either to modify the analyses of the kiln feeds or to permit the practical substitution of other available components, and thus adjust the chemical ratios of your raw materials to broaden your production to include all five standard Types of cement (I-II-III-IV-V). It provides for the economical use of inferior limestones; materially lengthens the life of the quarry; and reduces costs by avoiding selective quarrying.

When properly integrated with the grinding and classification circuits, the Flotation Process usually involves a saving in power; and burning characteristics of the final compositions are improved. The total savings may more than offset the operating costs of flotation. The rejects of the process may be a saleable by-product.

Normally the Flotation Process can be installed in your plant without affecting existing equipment or interfering with your production schedule.

Each quarry involves special conditions, and special flow sheet requirements. Our laboratory and pilot plant are fully equipped to handle a thorough investigation of your materials. After this investigation, by mining and chemical engineers, trained in cement chemistry, we can design, equip, and supervise the erection of a complete raw-material plant, engineered to meet your individual requirements. Preliminary examinations are made without obligation on your part. Write us for detailed information.

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S-9

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GRUENDLER HAMMERMILL

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The Gruendler Mobile 2-in-1 complete Crushing & Screening Plant

Here shown is the Gruendler Model 75 at work for The Bailey Limestone Co., Kirksville, Mo. Designed for 30 T.P.H. on AG-LIME and 100 T.P.H. on AGGREGATES.

Features:

GRUENDLER 3XD 2-in-1 HAMMERMILL

Ample CONVEYOR and SCREEN CAPACITY plus trouble free Drives have made it possible to almost double the rated capacity of the plant.

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Bureau of Mines Safety Awards

SIX MINES, quarries and open-pit mines whose safety records were the best in their respective groups in 1952 were recently awarded "Sentinels of Safety" trophies for the 28th National Safety Competition, sponsored by the Bureau of Mines. Certificates of Achievement were also awarded to 145 other plants which operated a total of over 17,000,000 man-hours during 1952 without a lost-time injury.

The trophy winner of the underground nonmetal mines was the Annandale mine of Michigan Limestone Division, U.S. Steel Co., Boyers, Penn., for working 746,135 man-hours without a lost-time injury. Winner of the open-pit mines classification was the Noralyn mine of International Minerals and Chemical Corp., Bartow, Fla., for working 715,588 man-hours without a lost-time injury. The winner of the stone-quarry group was the Hillsville quarry of Michigan Limestone Division, Hillsville, Penn., which worked 452,548 man-hours without a lost-time injury.

Plants in the rock products industries receiving Certificates of Achievement were:

Nonmetallic Mineral Mines

Crestmore limestone mine, Riverside, Calif., operated by Riverside Cement Co.
Ironton limestone mine, Ironton, Ohio, operated by Alpha Portland Cement Co.
Jonathon limestone mine, East Fultonham, Ohio, operated by Columbia Cement Div., Pittsburgh Plate Glass Co.
Kaylor limestone mine, Kaylor, Penn., operated by Michigan Limestone Div., United States Steel Co.
Buffalo Creek limestone mine, Worthington, Penn., operated by Michigan Limestone Div., United States Steel Co.
Plant No. 9 limestone mine, West Winfield, Penn., operated by Penn-Dixie Cement Corp.
No. 3 cement rock and limestone mine, West Coplay, Penn., operated by Coplay Cement Manufacturing Co.
Acme gypsum mine, Acme, Texas, operated by Certain-teed Products Corp.
Kimballton limestone mine, Kimballton, Va., operated by National Gypsum Co.
Bakerton stone and lime mine, Bakerton, W. Va., operated by Standard Lime and Stone Co.
Manheim limestone mine, Manheim, W. Va., operated by Alpha Portland Cement Co.

Open-Pit Mines

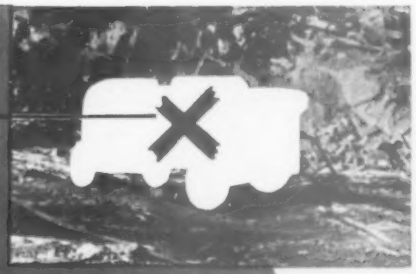
Pence Valley phosphate mine, Bartow, Fla., operated by International Minerals and Chemical Corp.
Achan phosphate mine, Mulberry, Fla., operated by International Minerals and Chemical Corp.
Columbia phosphate mine, Columbia, Tenn., operated by Monsanto Chemical Co.

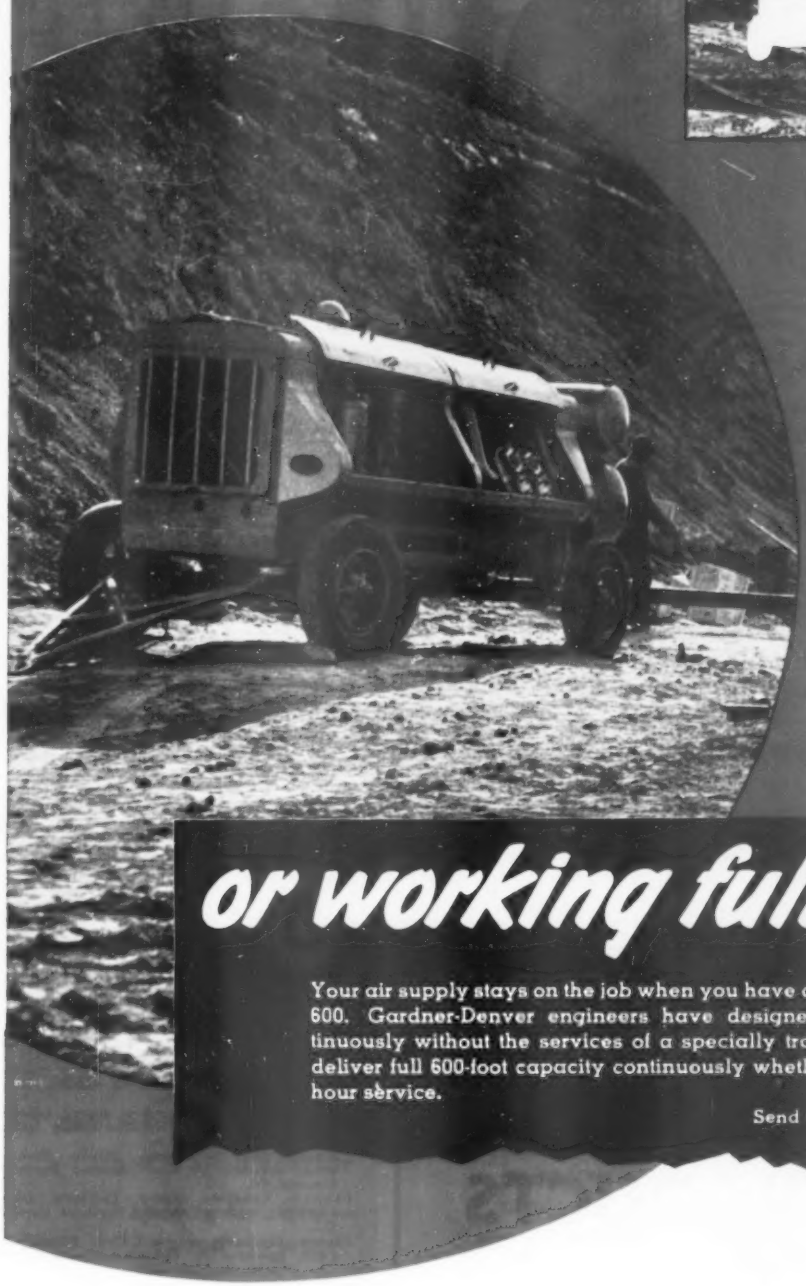
Quarries

St. Stephens limestone quarry, St. Stephens, Ala., operated by Lone Star Cement Corp.
Birmingham limestone quarry, Birmingham, Ala., operated by Lone Star Cement Corp.
Birmingham limestone quarry, Tarrant, Ala., operated by Lehigh Portland Cement Co.
Birmingham limestone quarry, Birmingham, Ala., operated by Alpha Portland Cement Co.
Okay Annona chalk quarry, Okay, Ark., operated by Ideal Cement Co.
Permanente limestone quarry, Permanente, Calif., operated by Permanente Cement Co.
Klondike limestone quarry, Oro Grande, Calif., operated by Riverside Cement Co.
Natividad dolomite quarry, Natividad, Calif., operated by Kaiser Aluminum and Chemical Corp.
Portland limestone quarry, Portland, Colo., operated by Ideal Cement Co.
Boettcher limestone quarry, LaPorte, Colo., operated by Ideal Cement Co.

(Continued on page 220)

GONE TO THE "HOSPITAL"?





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For Higher Production in the Roughest Footings . . .

Choose a . . . NELSON Q-11

UNSTABLE FOOTINGS won't slow down a Nelson Q-11! Mounted on self-cleaning crawler tracks to assure maximum possible traction under all conditions . . . Hydraulic boom hoist has dual double-acting cylinders and can be automatically held at any desired position. Steel toothed feeder spirals bite into material without slugging shocks to heap it quickly into buckets.

UP TO 4 YDS. PER MINUTE of sand, gravel, broken stone (up to 3" cube), top soil and other materials can be loaded hour after hour under almost any weather or soil conditions. High boom available for use with big trucks. One man operation . . . Gives high-speed loading at rock bottom cost!

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MANUFACTURERS OF LOADERS SINCE 1917

ROCK PRODUCTS
THE
Recognized Authority
OF THE
Non-Metallic
Minerals Industry

Safety Awards

(Continued from page 218)

North Branford No. 7 crushed stone quarry, North Branford, Conn., operated by New Haven Trap Rock Co.

Plant No. 1 crushed traprock quarry, Middlefield, Conn., operated by New Haven Trap Rock Co.

Clinchfield Plant No. 2 limestone quarry, Clinchfield, Ga., operated by Penn-Dixie Cement Corp.

Bennie and Harvey monumental stone quarry, Lexington, Ga., operated by Bennie and Harvey Co.

Bailey Falls limestone quarry, Oglesby, Ill., operated by Marquette Cement Manufacturing Co.

Dixon limestone quarry, Dixon, Ill., operated by Medusa Portland Cement Co.

Oglesby limestone quarry, Oglesby, Ill., operated by Lehigh Portland Cement Co.

Hecker crushed stone and agricultural lime quarry, Hecker, Ill., operated by Hecker Quarry, Inc.

Greencastle No. 2 crushed stone quarry, Greencastle, Ind., operated by The Ohio and Indiana Stone Corp.

Greencastle limestone quarry, Greencastle, Ind., operated by Lone Star Cement Corp.

Spencer crushed stone quarry, Spencer, Ind., operated by France Stone Products, Inc.

Lehigh limestone and brownstone shale quarry, Mitchell and Brownstown, Ind., operated by Lehigh Portland Cement Co.

Earlham limestone quarry, Earlham, Iowa, operated by Marquette Cement Manufacturing Co.

Mason City limestone and shale quarry, Mason City, Iowa, operated by Lehigh Portland Cement Co.

Davenport limestone quarry, Davenport, Iowa, operated by Dewey Portland Cement Co.

Newton limestone quarry, Waterloo, Iowa, operated by Waterloo Dredging Co.

Chanute limestone quarry, Chanute, Kan., operated by Ash Grove Lime and Portland Cement Co.

Bonner Springs limestone quarry, Bonner Spings, Kan., operated by Lone Star Cement Corp.

Iola limestone and shale quarry, Iola, Kan., operated by Lehigh Portland Cement Co.

Thomaston limestone quarry, Thomaston, Maine, operated by Dragon Cement Co., Inc.

Security limestone quarry, Hagerstown, Md., operated by North American Cement Corp.

Blue Mount traprock quarry, Blue Mount, Md., operated by The J. E. Baker Co.

Union Bridge limestone quarry, Union Bridge, Md., operated by Lehigh Portland Cement Co.

National City gypsum rock quarry, National City, Mich., operated by National Gypsum Co.

Mendota limestone quarry, Mendota, Minn., operated by J. L. Shiely Co.

Marquette limestone quarry, Cape Girardeau, Mo., operated by Marquette Cement Manufacturing Co.

St. Louis limestone quarry, St. Louis, Mo., operated by Alpha Portland Cement Co.

Louisville limestone quarry, Louisville, Neb., operated by Ash Grove Lime and Portland Cement Co.

Jordanville limestone quarry, Jordanville, N.Y., operated by The General Crushed Stone Co.

Hudson limestone quarry, Hudson, N.Y., operated by Lone Star Cement Corp.

Howes Cave limestone quarry, Howes Cave, N.Y., operated by North American Cement Corp.

Prospect Stone Plant No. 6 limestone quarry, Prospect, N.Y., operated by Eastern Rock Products, Inc.

Gibsonburg lime and limestone quarry, Gibsonburg, Ohio, operated by The Kelley Island Lime and Transport Co.

Diamond limestone quarry, Middle Branch, Ohio, operated by The Diamond Portland Cement Co.

Fairborn limestone quarry, Fairborn, Ohio, operated by Southwestern Portland Cement Co.

Frazier limestone quarry, East Fultonham, Ohio, operated by Columbia Cement Div., The Pittsburgh Plate Glass Co.

Ohio dolomite quarry, Millersville, Ohio, operated by The J. E. Baker Co.

Phillipsburg limestone quarry, Phillipsburg, Ohio, operated by The Laura Gravel and Stone Co.

Silica crushed stone quarry, Sylvania, Ohio, operated by Toledo Stone and Glass Sand Co.

Bloomville crushed stone quarry, Bloomville, Ohio, operated by The France Co.

Sylvania limestone quarry, Sylvania, Ohio, operated by Medusa Portland Cement Co.

Luckey limestone quarry, Luckey, Ohio, operated by National Gypsum Co.

Bridgeport limestone quarry, Bridgeport Penn., operated by Bethlehem Steel Co.

Hanover limestone quarry, Hanover, Penn., operated by Bethlehem Steel Co.

(Continued on page 222)

drive it anywhere

—get faster set-ups, better hole spacing, greater footage, better fragmentation, lower costs

Le Roi-CLEVELAND

T286 Self-Propelled Dual Drill Rig

It's 2 Le Roi-CLEVELAND patented air feeds and drills with air-motor booms mounted on a 25-hp tractor

3 speeds forward — 1 speed reverse

USE a Le Roi-CLEVELAND T286 and watch your men go places — go places they couldn't get to before on wagon-drill jobs. The T286 is self-propelled; you can drive it over almost any terrain — and tow the compressor right along behind. Your men can make their set-ups faster — spot holes easier for better fragmentation — without tugging or pushing.

Besides being self-propelled, the T286 drills in any direction — at any angle — uses less air. One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need.

Have your nearby Le Roi distributor tell you *all* the reasons why it pays to use the Le Roi-CLEVELAND T286 Self-Propelled Dual Drill Rig. Write for Bulletin RD-21.

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Geary-Jennings Sampler is as dependable in operation as it is right in principle. Handles wet or dry materials, cutting across the stream at right angles, with controlled variable speeds and length of intervals. Its shielded mechanism is entirely automatic, electrically operated, with no chance for intrusion of dirt or human tampering.

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The Geary-Jennings is widely used by both producers and consumers of rock products. They count on this rugged machine for true samples, provided at low cost. It occupies small space and adapts to any kind of plant requirements. Write today for the details.

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ROCK PRODUCTS

Has the Largest ABC Circulation and Highest Renewal Percentage in the Non-Metallic Minerals Industry.

Safety Awards

(Continued from page 220)

Plant No. 4 argillaceous limestone quarry, Nazareth, Penn., operated by Penn-Dixie Cement Corp.
Medusa limestone quarry, York, Penn., operated by Medusa Portland Cement Co.
Steelton limestone quarry, Steelton, Penn., operated by Bethlehem Steel Co.
Delta slate quarry, Delta, Penn., operated by The Funkhouser Co.
Nazareth cement rock quarry, Nazareth, Penn., operated by Lone Star Cement Corp.
White Haven sandstone quarry, White Haven, Penn., operated by The General Crushed Stone Co.
Martins Creek limestone quarry, Martins Creek, Penn., operated by Alpha Portland Cement Co.
Bethlehem limestone quarry, Bethlehem, Penn., operated by Bethlehem Steel Co.
No. 7 cement rock and limestone quarry, West Coplay, Penn., operated by Coplay Cement Manufacturing Co.
Rock Hill traprock quarry, Quakertown, Penn., operated by The General Crushed Stone Co.
Northampton cement rock quarry, Northampton, Penn., operated by Universal Atlas Cement Co.
Ormrod limestone and cement stone quarry, Ormrod, Penn., operated by Lehigh Portland Cement Co.
Brodhead cement rock quarry, Brodhead, Penn., operated by National Portland Cement Co.
Keystone cement rock quarry, Bath, Penn., operated by Keystone Portland Cement Co.
Billmeyer dolomite quarry, Bainbridge, Penn., operated by The J. E. Baker Co.
Stockertown cement rock quarry, Stockertown, Penn., operated by Hercules Cement Corp.
Cedar Hollow lime quarry, Devault, Penn., operated by Warner Co.
Reliance "B" cement rock quarry, Egypt, Penn., operated by Giant Portland Cement Co.
Plymouth Meeting dolomitic limestone quarry, Plymouth Meeting, Penn., operated by G. and W. H. Corson, Inc.
York limestone quarry, York, Penn., operated by National Gypsum Co.
Evansville cement rock quarry, Evansville, Penn., operated by Allentown Portland Cement Co.
Charmian roofing-granules quarry, Blue Ridge Summit, Penn., operated by The Funkhouser Co.
Montgomeryville crusher and building stone quarry, Montgomeryville, Penn., operated by Montgomery Stone Co.
Ormrod dolomitic limestone quarry, Ormrod, Penn., operated by Lehigh Stone Co.
Plant No. 3 limestone quarry, Richard City, Tenn., operated by Penn-Dixie Cement Corp.
Martha limestone quarry, Martha, Tenn., operated by Marquette Cement Manufacturing Co.
Asbury Knoxville lime quarry, Knoxville, Tenn., operated by The Standard Lime and Stone Co.
Fort Worth limestone quarry, Fort Worth, Texas, operated by Trinity Portland Cement Div., The General Portland Cement Co.
Dallas limestone and shale quarry, Dallas, Texas, operated by Lone Star Cement Corp.
New Braunfels limestone quarry, New Braunfels, Texas, operated by United States Gypsum Co.
Unit No. 1 limestone and shale quarry, Dallas, Texas, operated by Trinity Portland Cement Div., The General Portland Cement Co.
Unit No. 2 limestone and shale quarry, Dallas, Texas, operated by Trinity Portland Cement Div., The General Portland Cement Co.
Devil's Slide limestone quarry, Devil's Slide, Utah, operated by Ideal Cement Co.
Stephens City limestone quarry, Stephens City, Va., operated by M. J. Grove Lime Co.
Evans limestone quarry, Evans, Wash., operated by United States Gypsum Co.
Mofer dolomite quarry, Millvile, W. Va., operated by Michigan Limestone Div., United States Steel Co.
Inwood limestone quarry, Inwood, W. Va., operated by The J. E. Baker Co.
Granite Canon ballast quarry, Cheyenne, Wyo., operated by Morrison-Knudsen Co., Inc.

Feldspar Company Sold

GOLDING-KEENE CO., Keene, N.H., in operation since 1922 and an independent producer of feldspar, has been sold to George G. Copeland, the representative for a Canadian feldspar company. The purchase, in addition to the Gilsum and Alstead mines, included Northern Feldspar, Inc., West Rumney, N. H., and Standard Flint and Spar Corp., Trenton, N. J.

Select the best for each particular purpose from among the many Harbison-Walker types and classes especially adapted for all the various factors and conditions involved in the operation of rotary cement kilns.

Brands with long life records
Basic Refractories for High Temperature Zones

MAGNECON—THERMAG—MAGNEX

Leading High-Alumina Brands

ALUSITE 70% Alumina—ANCHOR 60% Alumina—CORALITE 80% Alumina

Various high duty and super-duty fireclay brick brands of superior quality are available from plants which afford lowest transportation costs—Pennsylvania—Missouri—Ohio—Alabama—Texas—Kentucky.

—and the outstanding abrasion resistant refractories—DURO and WYLAM A.

—as well as all classes of Plastic Fire Brick, Castables, Mortars and Cements and Insulating Refractories.

Harbison-Walker Refractories Company
AND SUBSIDIARIES
WORLD'S LARGEST PRODUCER OF REFRACTORIES
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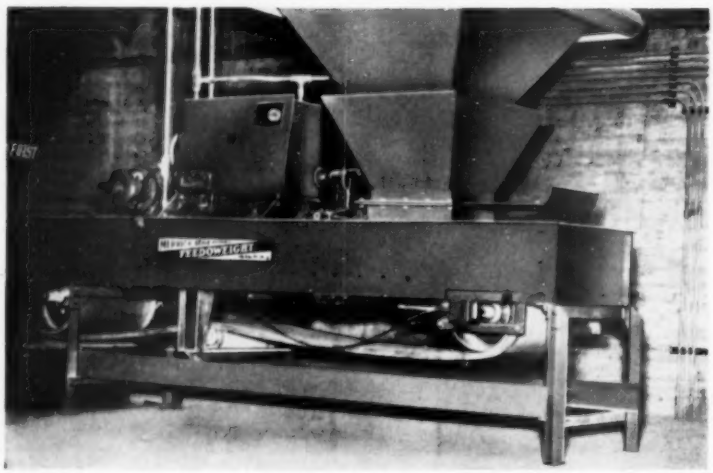

BECAUSE ACCURATE FEED CONTROL

by weight means accurate proportioning of raw mix components as well as Clinker and Gypsum. Specifying MERRICK equipment assures greater product uniformity.

Over 40 years of specialized MERRICK experience in the field of automatic and continuous weighing and feeding guarantees dependability and top performance.

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Industrial Radio Rules Amended

THE FEDERAL COMMUNICATIONS COMMISSION has amended Section 11.501 of the rules governing the special industrial radio service. The amendment permits a company with an F.C.C. license, or one requesting a license, to operate its radio facilities inside all standard metropolitan areas where the population is not over 500,000, in connection with all projects being served. Previously, producers were not permitted to communicate in any incorporated community of any size in connection with non-public projects. Much of the credit for the more liberal F.C.C. ruling rightfully belongs to the joint efforts of the National Sand and Gravel and National Ready Mixed Concrete Associations. The two associations have participated actively in the F.C.C. proceedings and submitted petitions which asked basically for the "removal of the restrictive provision in the licenses granted, permitting the licensee to operate from any place at any time." Although further changes in the F.C.C. rulings will probably be made, the associations believe that the 500,000 limitation will not be lowered and that companies in "standard metropolitan areas" of less than 500,000 population will be reasonably safe now in applying for licenses in the special industrial radio service.

Gypsum Safety Record

LLOYD H. YEAGER, general manager of the Gypsum Association, reported at the association's annual meeting that the accident-frequency rate in operating plants of the gypsum industry has been reduced approximately 30 percent in the last year, from 13.1 to 9.5, which is a new all-time low for the industry. During the last 10-year period, the rate has been reduced approximately 65 percent, and 162 fewer accidents were reported for 1952 as compared to 1943, despite a 63 percent increase in the total number of hours worked. Forty-eight plants participated in the 1952 competition. National Gypsum Co.'s New York City plant, won the award in the Class A competition, for plants operating 600,000 man-hours or more, with a frequency rate of 2.72. The United States Gypsum Co. plant at Sweetwater, Texas, won second-place honors with a 2.92 rating in the same class. Eleven plants in Class B, C, and D, reported no lost-time accidents for the entire year. National Gypsum's plant at Savannah, Ga., was the winner among the Class B plants which operated between 425,000 and 600,000 man-hours. United States Gypsum Co.'s plant in Jacksonville, Fla., also had an accident-free record in this group. Winner among the Class C plants, which operated between 275,000 and 425,000 man-hours, was United States Gypsum's plant at

SIMPLICITY GYRATING SCREEN— A VITAL COMPONENT IN THE EFFICIENT BARBER-GREENE 848 BITUMINOUS PLANT

The Barber-Greene 848 Plant is well known to road construction men for fast, efficient production of the finest bituminous mix. And no wonder. For the aggregate fed into the plant is sized and separated on a Simplicity Model BH Enclosed Gyrating Screen. This 3½ Deck Screen has a rated capacity of 100-120 tons per hour, but in actual operation, it consistently handles aggregate at a much higher rate. Simplicity single, double and triple deck Gyrating Screens are available in a number of sizes to screen and separate materials fast and accurately. Maintenance and operating costs are unusually low. For complete information about Simplicity Screens, Os-A-Veyors and other equipment, consult a Simplicity sales engineer or write us today.

128

- **Sales Representatives In All Parts Of The U.S.A.**
- **For Canada:** Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario
- **For Export:** Brown and Sites, 50 Church Street, New York 7, N. Y.

Simplicity
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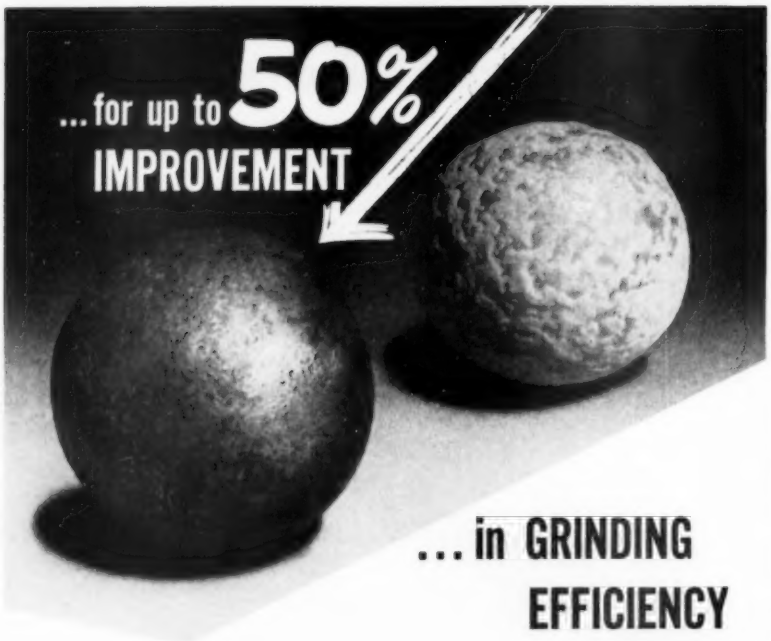

keep grinding mill balls clean with TDA

There's a big difference between these two identical steel grinding mill balls . . . taken from the same grinding mill. And the difference is TDA catalyzing grinding aid. The coated ball was used *without* TDA. The ball that's uncoated, still in perfect shape to do a good grinding job, was removed from the mill 24 hours *after* the introduction of TDA.

With TDA, you get top performance out of your mill. TDA increases grinding rates of Type 1 cement 15 to 20%, of Type 2 cement 20 to 25%, of Type 3 cement 25 to 50%. TDA gives you these increases, even in closed circuit grinding because the dry dispersing effect increases air separator efficiency.

TDA more than pays its own way. Its cost is amortized as you use it . . . and you use it only as you need it.

With modified TDA (MTDA) at a slightly higher price, you get still greater efficiency even under adverse conditions.

DA DEWEY and ALMY Chemical Company

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BUY U.S. SECURITY BONDS NOW!

Charlestown, Mass. Also in this group to receive perfect scores were Western Gypsum Co.'s plant at Sigurd, Utah, and United States Gypsum's plant at Detroit, Mich. In Class D, United States Gypsum Co.'s plant at Sigurd, Utah, received the trophy for plants working less than 100,000 manhours. Other plants in this group which reported no disabling accidents were those of Ideal Cement Co. at Hanover, Mont., and Portland, Colo., and of United States Gypsum Co. at Loveland, Colo., at Cleveland, Ohio, and at Milwaukee, Wis.

Slag Production

PRODUCTION OF IRON BLAST-FURNACE SLAG totaled 26,899,376 short tons, valued at $33,874,209, in 1952, compared with 29,327,434 short tons, valued at $36,307,693, in 1951, as reported by the Bureau of Mines. Included in the report are the outputs of 42 companies operating 67 plants for processing air-cooled slag and 18 plants expanding slag. Fourteen companies reported production of granulated slag.

Screened air-cooled slag declined 10 percent to 21,056,846 short tons, of which 19,002,814 tons were used as railroad ballast, as aggregate in portland-cement construction, bituminous construction of all types, and miscellaneous highway construction. Other principal uses for this type were in the manufacture of concrete block, mineral wool, and built-up roofing and roofing granules.

Unscreened air-cooled slag amounted to 1,364,463 short tons, a decrease of 21 percent compared with the preceding year. Approximately 39 percent of the output was used as aggregate in highway and airport construction, 17 percent was used as railroad ballast, and the remainder in unspecified miscellaneous uses.

The only type of slag produced in greater quantity in 1952 than in 1951 was granulated slag which increased 11 percent to 2,507,604 short tons. Of this amount, 48 percent was used as road fill, 43 percent as a raw material in the manufacture of hydraulic cement, and the remainder was about evenly divided between concrete block manufacture, agricultural slag and liming, and miscellaneous uses.

Iron blast-furnace slag is produced in 15 states, with most of the tonnage processed in the steel centers of Ohio, Pennsylvania, Alabama and Illinois. The recovery of iron by slag processors during 1952 amounted to 351,774 short tons, a decrease of 5 percent from 1951.

Tunisian Phosphate

TUNISIA exported 1,752,800 metric tons of phosphate rock in 1952 to Italy, the principal purchaser, and to France, United Kingdom, Spain and Germany. Also exported were 98,300 tons of hyperphosphate, which went principally to Brazil, New Zealand, Finland, Indo-China and Chile.

NEW INCORPORATIONS

Racine Limestone Co., Inc., Franksville (near Racine), Wis., has been incorporated by Morris Bradley, J. Frank Bradley, both of Franksville, and John Lathers, Lanark, Ill., with Morris Bradley as registered agent. A capital stock of 500 shares of common, no-par-value stock has been authorized by the state.

Medina Concrete Products, Inc., Medina, Ohio, has been incorporated with 250 shares of no-par-value common stock. The incorporators are Edwin J. Campbell, Harry E. Davenport and Edwin D. Rickard.

Texas Stressed Concrete Corp., Austin, Texas, has been incorporated by Jack R. McKinney, Warren S. Bellows, Jr., and J. H. Blackaller. Capital stock consists of 3000 shares of no-par-value stock.

Industrial Gypsum Corp. of America, a $1,000,000 Nevada Corp., has filed articles of incorporation to operate in the State of California. Ernest L. Gee, San Jose, Calif., has been named as California agent for the corporation.

Texas Sand Co., San Antonio, Texas, was recently incorporated with $30,000 capital stock. The incorporators are Alfred A. Gianotti and Clementine Ramsey.

Shawnee Quarries, Inc., Shawnee, Kan., has been incorporated by John V. and Mae S. Creten and James E. Devine. Capitalization was listed as $50,000.

B & T Concrete Co., Fort Worth, Texas, has been incorporated with $10,000 capital stock. J. D. and Gladys H. Teague and Roy E. Wright are the incorporators.

Texas Concrete Block Co. of Lubbock, Lubbock, Texas, has been incorporated by Jack Frost, E. G. Kingsberry and E. D. Bohls. Capital stock was listed at $10,000.

Texas Concrete Block Co. of Midland, Midland, Texas, has been incorporated with a capital stock of $10,000. The incorporators are Jack Frost, E. G. Kingsberry and E. D. Bohls.

Texas Concrete Block Co. of Abilene, Abilene, Texas, has been incorporated with $10,000 in capital stock. Jack Frost, E. G. Kingsberry and E. D. Bohls are the incorporators.

North Side Ready-Mix Concrete Co., Houston, Texas, has been incorporated by James B. Baumgardner, Clarence Watkins and Bryce Pomilla. Capital stock amounts to $10,000.

E. G. John Sand and Gravel Co., Taylor, Texas, has been incorporated by F. I., Joe, and Annie John. Capital stock was listed at $49,000.

Kanab Masonry Products Co., Kanab, Ariz., has been incorporated by Boyd McAllister.

...for better MASONRY CEMENT

at LOWER COST

specify ALL-IN ONE airalon

Airalon is an air entraining agent and plasticizer specially formulated for masonry cement.

Economical—Airalon enables the cement maker to produce his present quality cement *at lower cost* . . . or to produce a higher quality cement at no increase in cost.

Ready-to-Use—Airalon contains, in one easy-to-handle compound, the saponified resin acids and fatty acids needed to make a high quality masonry cement. Airalon is added at the cement mill as received, in liquid form, which simplifies inventory, handling and storage. Also available as a pourable, water-soluble dry powder.

Proven and Approved—Airalon has been exhaustively tested in our own laboratories and in extended commercial grinds . . . it is also suitable for intergrinding with air entraining cement and is accepted by ASTM under Cement Specification C175-48T.

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MANGANESE STEEL CASTINGS

for PULVERIZERS CRUSHERS ROLLS SCREENS

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Salt Lake City, Utah
6

FINANCIAL

IDEAL CEMENT CO., Denver, Colo., reports the following income account for the years ending December 31:

	1952	1951
Sales & oth. rev.	$52,054,405	$38,644,281
Cost & exp.	30,355,593	20,218,892
General taxes	965,813	711,232
Depr., depl., etc.	3,701,723	2,306,280
Net earn.	17,031,276	15,407,877
Other income, net	554,566	497,342
Total income	17,585,842	15,905,219
Interest	166,285	97,132
Pension trust fd.	660,455	448,860
Income taxes	8,335,000	7,760,000
Excess profits tax	840,000	1,200,000
Minority int.	2,869	
Net income	7,581,233	6,399,227
Earn. surp., 1-1	19,094,192	16,021,876
Dividends	4,088,957	3,326,911
Earn. surp., 12-31	22,586,468	19,094,192
Earn. per share	$4.63	$3.95
No. of shares	1,636,140	1,621,498

CANADA CEMENT CO., LTD., Montreal, Que., reports the following account of income for the fiscal years ended November 30:

	1952	1951
Earn. per com. sh.	$4.62	$5.88
Prof. before income taxes	$9,084,994	$10,339,648
Income taxes	5,040,000	5,535,000
Net profit	4,044,994	4,804,648
No. com. shares	600,000	600,000

BLOOMINGTON LIMESTONE CORP., Bloomington, Ind., reports a net income of $162,627, or $12.11 per share on 13,428 shares for 1952, as compared to the 1951 figure of $234,497, or $17.47 per share on 13,422 shares. Net sales amounted to $1,672,483 for 1952 and $2,237,060 for the year previous.

CERTAIN-TEED PRODUCTS CORP., Ardmore, Penn., for the years ending December 31, reports the following account of earnings:

	1952	1951
Net sales	$58,626,319	$62,507,590
Prof. contr. proc.	421,617	374,038
Total	59,047,936	62,881,628
Cost of sales	47,273,050	48,802,953
Selling, etc., exp.	4,515,785	4,333,166
Net earn.	7,259,101	9,745,509
Other income	474,777	663,106
Total income	7,733,878	10,408,615
Other deductions	350,465	308,432
Income taxes	3,746,570	5,040,030
Net income	3,636,843	5,060,153
Earn. surplus, 1-1	25,044,685	21,608,411
Com. divs.	1,826,872	1,623,879
Earn. surp., 12-31	26,854,656	25,044,685
Earn. per sh.	$2.23	$3.11
No. of shares	1,623,879	1,623,879

UNITED STATES POTASH CO., Carlsbad, N.M., gives the following income account for the years ending December 31:

	1952	1951
Net sales	$15,026,836	$14,896,248
Cost of sales	8,529,957	8,013,291
Selling, etc., exp.	1,314,839	1,164,662
Depr.	712,646	600,895
Empl. retire. plan	391,016	354,957
Oper. profit	4,078,378	4,762,444
Other income	88,531	116,389
Total income	4,166,909	4,878,833
Other deductions	45,051	429
Fed. inc. tax	1,055,000	1,380,000
Pr. yrs. tax adj.	cr. 5,550	cr. 33,435
State inc. tax	30,213	34,709
Net income	3,042,195	3,497,131
Earn. surplus, 1-1	7,638,667	6,241,536
Com. divs.	2,100,000	2,100,000
Earn. surpl., 12-31	8,580,862	7,638,667
Earn., com. share	$2.90	$3.33
No. of com. shares	1,050,000	1,050,000
Total taxes	1,693,760	1,949,904

CONSOLIDATED ROCK PRODUCTS CO., Los Angeles, Calif., reports a net profit of $414,850, or $0.13 per share on 3,176,093 shares for 1952. This compares with a net profit of $586,744, or $0.18 per share on 3,176,093 shares for 1951. Net sales for 1952 amounted to $15,850,190, as against $16,277,401 for the previous year.

CALAVERAS CEMENT CO., San Francisco, Calif., lists a net income for 1952 of $160,002, or $0.46 per share on 351,198 shares, as against a net income of $618,604, or $1.75 per share for 1951.

SPOKANE PORTLAND CEMENT CO., Spokane, Wash., for the year ending December 31, 1952, reports net sales of $2,090,686, as against net sales of $2,246,911 for the previous year. Net profit amounted to $85,615, or $0.43 per share on 200,000 shares for 1952, compared to $172,732, or $0.86 per share for 1951.

RIVERSIDE CEMENT CO., San Francisco, Calif., has reported the following list of earnings for the 12 months ending December 31:

	1952	1951
Oper. profit	$5,775,120	$6,287,558
Depr. depl. & amort.	1,043,652	729,596
Fed. inc. tax	2,062,175	2,745,423
Excess profits tax	400,000	800,000
Net income	2,269,293	2,012,539
Earn., surp., 1-1	5,375,062	3,962,523
Class A divs.	600,000	600,000
Earn. surp., 12-31	7,044,355	5,375,062
Earn., cl. A shs.		
Priority basis	$9.46	$8.39
Partic. basis	1.50	1.50
Earn., cl. B sh.	5.53	4.79
No. of cl. A shs.	240,000	240,000
No. of cl. B shs.	345,000	345,000

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., reports net sales of $27,281,126 for 1952, as compared to $22,952,742 for the previous year. Net income for 1952 was listed as $3,527,441, or $3.92 per common share on 850,000 shares and $22.05 per pfd. share on 160,000 pfd. shares, as compared to a net income of $2,995,540, or $3.30 per common share on 850,000 shares and $18.58 per pfd. share on 161,250 pfd. shares for 1951.

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, lists a net profit of $1,242,241, or $5.62 per share on 221,109 shares for the year ending December 31, 1952, as against a net profit of $1,460,197, or $6.60 per share on the same amount of shares for 1951. Net sales for 1952 were reported as $17,725,344, as against $20,218,598 for the previous year.

PENN-DIXIE CEMENT CORP., New York, N.Y., lists a net profit of $2,671,886, or $4.44 per share on 602,136 shares for 1952, compared to a net profit of $2,757,520, or $4.58 per share for the previous year. Reported net sales for 1952 amounted to $24,931,651, against $25,565,410 for the previous year.

PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., reported a net income of $1,928,068, or $2.75 per common share on 643,720 shares and $62.20 per pfd. share on 31,000 shares for 1952, year ending December 31, compared to $2,082,325, or $2.99 per common share and $67.17 per pfd. share for the previous year. Net sales listed were $9,500,423 for 1952, and $9,982,251 for 1951.

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INFORMATION

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TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

1 APRON FEEDERS—Universal Engineering Corp. has released a four-page bulletin on its extra-heavy-duty, 9-in., pitch-apron feeders for mines, quarries and allied industries. Specifications, construction details, and illustrations are included.

2 ASPHALT PLANTS — Standard Steel Corp. has issued Bulletin 525 describing and illustrating Model RB asphalt plants.

3 BAGS—Hudson Pulp & Paper Corp. has issued two brochures on Multi-Wall sacks. One points out the need for proper humidification of the storage room to keep sacks from breaking, and the other describes benefits obtained through their use.

4 BULLDOZERS — Gar Wood Industries, Inc. has announced Catalog F-165 showing models of cable and hydraulic dozers and control units for Allis-Chalmers tractors. Cut-aways, engineering drawings, and photographs are included.

5 CABLE CONTROLS—Caterpillar Tractor Co. has released a booklet, Form 30598, describing and illustrating rear and front-mounted cable controls. Cutaway and model views are also included.

6 CAR HANDLING—Whiting Corp. has published Bulletin T-112 describing and illustrating Model 2TM Trackmobile. Specifications, performance and dimension tables, and typical application photographs are included.

7 CASTINGS—American Brake Shoe Co. describes Mechanite castings for industrial use in an 8-page folder. Typical applications are pictured and a table of standard bar stock sizes, comparison chart and characteristics are included.

8 CEMENT PACKER—F. L. Smidth & Co. has issued a pamphlet describing the Rotary Fluxo Packer, a high capacity, automatic, cement packing machine. Drawings are included which illustrate the equipment layout, as well as typical application photographs.

9 COMBUSTION GAS TURBINES—Westinghouse Electric Corp. has published a 24-page booklet, No. B-5859, on combustion gas turbine power plants for mechanical drive applications. Four types are described and load diagrams, dimensioned outline drawings, performance curves, and cutaway drawings are given for each type. Design and structural features are also described.

10 CONCRETE APPLICATORS—C. L. Ballard has available two folders on the Prehy grouter and concrete gun, giving specifications, descriptions and illustrations.

11 CONCRETE MIXER—Whittemann Machinery Co. has released a specification sheet for the Kelley 12-T concrete mixer. Illustrations of the machine are included.

12 CONCRETE TESTING—Soiltest, Inc. has published a 72-page catalog, No. 53, describing and illustrating over 800 items of apparatus for engineering tests of soils, concrete and bituminous materials. Sections on general laboratory apparatus, ovens, scales, mixing machines and laboratory furniture are included, as well as equipment for chemical and agricultural tests of soils.

13 CONTROLLER—The Foxboro Co. has issued Bulletin 465, describing a circular case controller. Typical applications in various industries and installation diagrams are shown along with illustrations of a variety of accessory equipment. Selection data and the individual functions of the instrument components are also given.

14 CONTROLS—Allis-Chalmers Manufacturing Co. has released an eight-page manual entitled "Proper Maintenance of Control." A "trouble-shooting" chart giving symptoms, causes and cures is included as well as a preventive maintenance check list for electrical control devices.

15 CONVEYOR CHAINS—Chain Belt Co. is distributing Bulletin 53-59 on the R, RX and RR series of drive and conveyor chains. Construction details and specifications are also included.

16 CONVEYORS—Stephens-Adamson Manufacturing Co. has released Vol. 204, a 14-page booklet, describing and illustrating various applications of Redler conveyors. These include elevator, vibrating and distributing conveyors, as well as box car unloaders.

17 CORING DRILL—Sprague & Henwood, Inc. has published Bulletin 330, describing and illustrating the Series "M" double tube core barrel, used in conjunction with the Series "M" coring bit. Specifications and a list of accessory drilling equipment are also given.

18 CRANES—The Thew Shovel Co. has produced a 12-page picture booklet showing the varied applications of its crane line on docks, barges and ships. Short job descriptions are given.

19 DIESELS—Caterpillar Tractor Co. devotes an eight-page booklet to explaining the use of diesel-electric sets in various types of business and industry. Application photographs are included, as well as a chart listing sizes and rated output of the sets.

20 DRILLS — Thor Power Tool Co. has brought out Bulletin JE1640 giving details and specifications of the Thor No. 380 automatic drilling machine for one-man operation.

21 DUMP TRAILERS—Hercules Steel Products Corp. has issued a catalog sheet describing and illustrating two front-mounted, twin telescopic, dump-trailer packages. Specifications are also listed.

22 EARTHMOVING EQUIPMENT — The Euclid Road Machinery Co. has prepared a 48-page booklet entitled "Euclid Equipment for Moving Earth, Rock, Coal and Ore." The various types of earthmoving equiment are described and illustrated, and selection data is also given.

23 ELECTRODES—The Sight Feed Generator Co. has prepared a booklet describing its line of Rexarc electrodes. Details and recommended applications of each electrode is given along with suggestions for obtaining best results.

24 EXCAVATORS AND CRANES — Gar Wood Industries, Inc. has brought out three specification booklets on its ¾-cu. yd. Model 75A and Model 75B excavators, and the 75BT truck cranes. Capacities, ranges, reaches and attachments for the models are listed, as well as information on power transmission, travel speeds and power plants.

25 FEEDERS—Hardinge Co., Inc. has published Bulletin 33-E on regulating type feeders to control the rate of discharge of materials from bins to conveyors, etc. Design details, capacities, dimensions and application data are also included.

26 FLOTATION EQUIPMENT — Denver Equipment Co. has released a bulletin entitled, "Froth Flotation, Industrial and Chemical Applications." Examples of separating near-colloidal size particles from saturated brine, fractionation of fine clays, water purification and correcting stream pollution are given.

27 HARD-FACING ALLOY—Wall Colmonoy Corp. has issued a pamphlet, No. 104, illustrating and describing the application of Colmonoy No. 6, an all purpose hard-facing alloy. Typical uses and representative parts are also listed.

28 HARD SURFACING—The Lincoln Electric Co. has released Bulletin 466, describing hard-surfacing applications. Various types of hard-surfacing equipment are described and illustrated, while electrode and hard surfacing guides and flux information are also given.

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29 INDUSTRIAL FURNACES—Air Devices, Inc. has published a booklet describing and illustrating the Agitar furnaces. Direct-fired, hot gas generating is discussed for process drying and product heating. Detailed drawings and typical installation photographs are included along with a capacity table.

30 INDUSTRIAL PAINT — Rust-Oleum Corp. has announced a six-page color-chip folder, Form No. 125, illustrating and describing its color finishes for plant interiors and machinery.

31 INDUSTRIAL TRUCKS—The Texas Co. has published Vol. 39, No. 6, of "Lubrication," describing hydraulic power and the industrial truck. Advantages, maintenance suggestions and a simplified lubrication plan for industrial trucks are included.

32 JAW CRUSHERS — Denver Equipment Co. has released Bulletin C12-B12 covering the construction and operation of two types of jaw crushers. Equipment illustrations, specifications, capacities, dimensions and advantages are included.

33 JET-PIERCING — International Acetylene Association has compiled a booklet on the inspection and demonstration of jet-piercing at Consolidated Quarries, Inc., from the program at its 1953 annual meeting. An explanation of jet-piercing, its applications and development, and a progress report are also given.

34 KILN CONTROL INSTRUMENTS—The Bristol Co. has released a catalog, No. P1255, listing electric, air-operated and electronic control instruments for furnaces, ovens, dryers and kilns. Engineering specifications, illustrations, various control arrangements and dimension sketches are included.

35 MATERIALS HANDLING—Allis-Chalmers Manufacturing Co. has issued a 12-page catalog entitled, "Modern Materials Handling." Action photographs of crawler and industrial wheel tractors, motor graders, and power units, including detailed views of rubber-tired earth moving equipment, are shown.

36 MATERIAL HANDLING EQUIPMENT —Union Metal Manufacturing Co. has published Catalog 83, describing and illustrating the Work-O-Matic material handling system. Equipment, including a gravity-fed hopper, bin box system, multi-duty storage boxes, trays, and an end-loading scoop are also illustrated.

37 METERS—Bailey Meter Co. has offered Bulletin 18, giving information on its line of meters, control equipment and engineering services. Specifications, illustrations and diagrams are included.

38 PERLITE PLASTER AND CONCRETE —Great Lakes Carbon Corp., Perlite Div., has issued a booklet, No. 21-A-5, describing Permalite plaster and concrete. Specifications, drawings and typical application photographs are included.

39 PNEUMATIC CONTROL ACCESSORIES—Minneapolis-Honeywell Regulator Co., Industrial Div., has issued Catalog 8950 describing and illustrating pneumatic control accessories. Included are air pressure regulators, air filters, pneumatic relays, control by-pass panels, valve positioners, etc. Data on control piping systems and the computing of air capacities are also included.

40 PRESTRESSED CONCRETE—John A. Roebling's Sons Corp. has available a catalog on strand and fittings for prestressed concrete. Application photographs and specification charts are included.

41 PUMPS AND COMPRESSORS — Pennsylvania Pump & Compressor Co. announced publication of Bulletin 546, describing briefly its line of air and gas compressors, dry vacuum pumps, aftercoolers, valves and centrifugal pumps for boiler feeding, general power plant and industrial applications. Illustrations, capacities and sizes of each are included.

42 ROAD MACHINERY—Cummins Engine Co., Inc. has released a 16-page booklet describing 17 models of its standard power equipment. Single and dual diesel units in equipment ranging from the 15-ton rear-dump to the 40-ton bottom dump coal hauler are also described.

43 ROTARY KILNS—F. L. Smidth & Co. has made available a paper presented at the American Chemical Society meeting, entitled, "Rotary Kilns and Their Application for Various Processes." Dry and wet processes are described as well as operation characteristics and applications of rotary kilns. Typical application photographs are also shown.

44 RUBBER HOSE—Hewitt-Robins Inc. has released a bulletin on the care of rubber hose. Entitled "Tips on Hose Care," it covers the use and storage of various types of hose, including steam, oil, gasoline, water, air, fire, suction and sandblast hoses.

45 SAND DRYERS—Standard Steel Corp. has issued a four-page brochure, No. 5323, on rock and sand dryers. Photographs and equipment details are given.

46 SCREENS — Simplicity Engineering Co. has prepared a 28-page, illustrated booklet on industrial screens, including gyrating, horizontal, heavy-duty scalping, sand and gravel, and light aggregate types. Capacity and dimension charts are also shown.

47 SEPARATORS — Southwestern Engineering Co., Separator Div., has released a booklet describing and illustrating Sweco separators for screening wet, dry, fine, coarse, heavy or light materials. Typical application photographs are also shown.

48 TRACTORS—Baker-Lull Corp., Sheppard Diesel Div., has prepared a brochure illustrating and describing applications of Sheppard diesel industrial tractors equipped with Baker-Lull Shoveloaders. Features, available attachments and specifications are also included.

49 TRUCK CRANE—Schield Bantam Co. has announced a six-page illustrated bulletin, No. TCR-201, describing the Model T-35 truck crane and attachments. Specifications, operating data, engineering features, applications and capacity charts are given.

50 TURBINE PUMPS — Worthington Corp. has published Bulletin W-450-B39, describing and illustrating vertical turbine pump applications. The company's engineering, research and testing facilities are also described.

51 VERMICULITE — Vermiculite Institute has available a booklet entitled, "Recommended Building Code Requirements for Vermiculite Plastering, Acoustical Plastic, Fireproofing, and Concrete." Drawings, concrete data, and fire-proofing test tables are included.

52 WELDERS—Westinghouse Electric Corp. appraises three basic a-c welding machines and accessories in a 17-page booklet, B-5622. Construction, operation and application of the models are described, while specifications and illustrations are also included.

53 WELDING HOSE—Quaker Rubber Corp. has issued a bulletin on welding hose. Cross sections and cutaway photographs are included, as well as construction, performance data, recommended uses, sizes, working pressures, weights and lengths.

54 WIRE ROPE SLINGS—American Chain & Cable Co., Inc. has issued Folder DH-421, describing the SW-55 wire rope sling. Specifications, dimensions and recommended uses are included.

55 WIRE ROPE SLINGS—Macwhyte Co. has released Booklet 5308 describing and picturing wire rope slings. Various types are shown and a specification chart is given.

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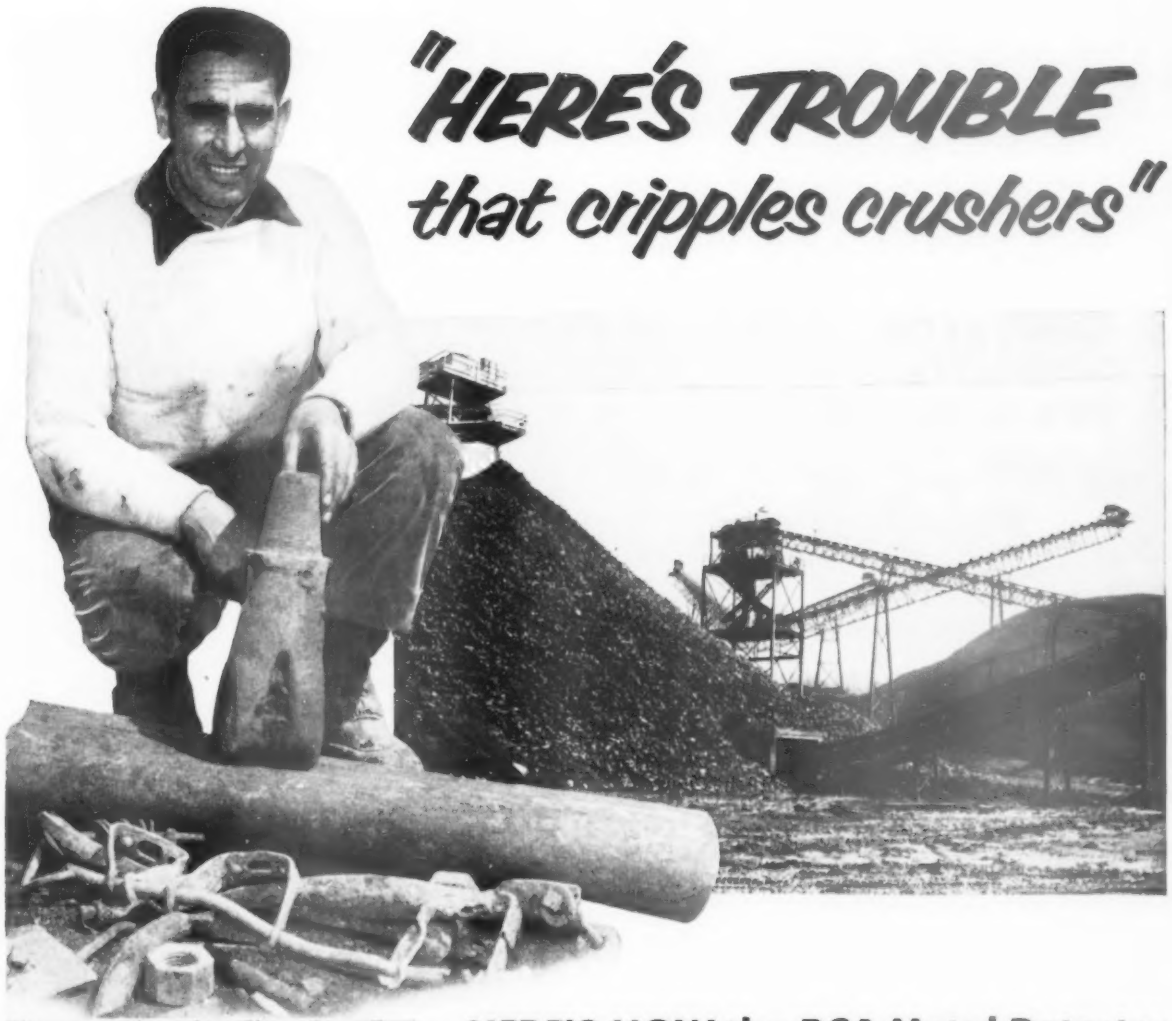

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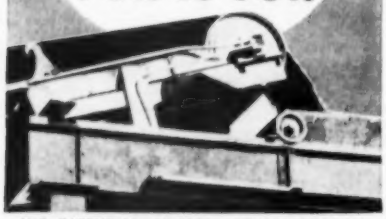

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Ohio Ready Mix Meeting

THE OHIO READY MIXED CONCRETE ASSOCIATION held its annual meeting June 23-24, at the Hotel Sheraton-Gibson, Cincinnati, Ohio.

The meeting was opened with a showing of the film "A Day in Court," which was recently purchased by the association for loaning out to members to create greater safety among ready-mixed concrete truck drivers and improved relations with the general public. Mr. Anderson of W. E. Anderson Sons Co., Columbus, Ohio, reported that his company purchased a copy of this film several months ago and, since that time, has shown it to the Columbus Police Department and to various civic groups and others interested in promoting safety. He stated that it was difficult to estimate the benefits gained from the public relations standpoint, but the benefits received by his own ready-mixed concrete truck drivers were quite evident. He also quoted the safety director of Columbus as saying that it was the finest film of its type of any that has been produced to date.

The opening address was given by President L. A. Kemter, who discussed the history and growth of the association and the activities of the past year. In the membership report, Mr. Kemter reported that four new active members and one associate member had joined the association during the past year, bringing present membership to 93 active and 26 associate members. The new active members are J. K. Horne & Son, Struthers, Ohio; Reed Builders Supply Co., Campbell, Ohio; Rohrer Builders Supply Co., Columbiana, Ohio; and City Coal & Supply Co., Youngstown, Ohio. The new associate member is The Solvay Process Division, Allied Chemical & Dye Corp., Cincinnati, Ohio.

Following reports by the secretary, treasurer and the auditing committee, R. P. Mumford, chairman of the short course committee, reported on the Toledo Ready-Mixed Concrete Short Course and discussed the 1954 short course to be held at the University of Cincinnati. Herbert G. Jahncke, vice-president, Jahncke Service, Inc., New Orleans, La., and also president of the National Ready Mixed Concrete Association, was a guest speaker at the morning session.

The luncheon program included an address by Vincent P. Ahearn, executive secretary of the National Ready Mixed Concrete Association, followed by the election and installation of officers. James A. Nicholson, Nicholson Concrete Co., Toledo, Ohio, was elected president, succeeding L. A. Kemter, Goff-Kirby Co., Cleveland, Ohio. Other new officers are Carl F. Shoaff, J. P. Loomis Coal & Supply Co., Akron, vice-president; and Ralph H. Anderson, W. E. Anderson Sons Co., Columbus, treasurer. Claude L. Clarke, Columbus, was re-elected secretary. Directors are L. A. Kemter; Harry P. Gottron, Gottron Brothers, Fremont; R. P. Mumford, Beckley-Myers Co., Springfield; and Harry M. Graff, Portsmouth Mixed Concrete, Inc., Portsmouth.

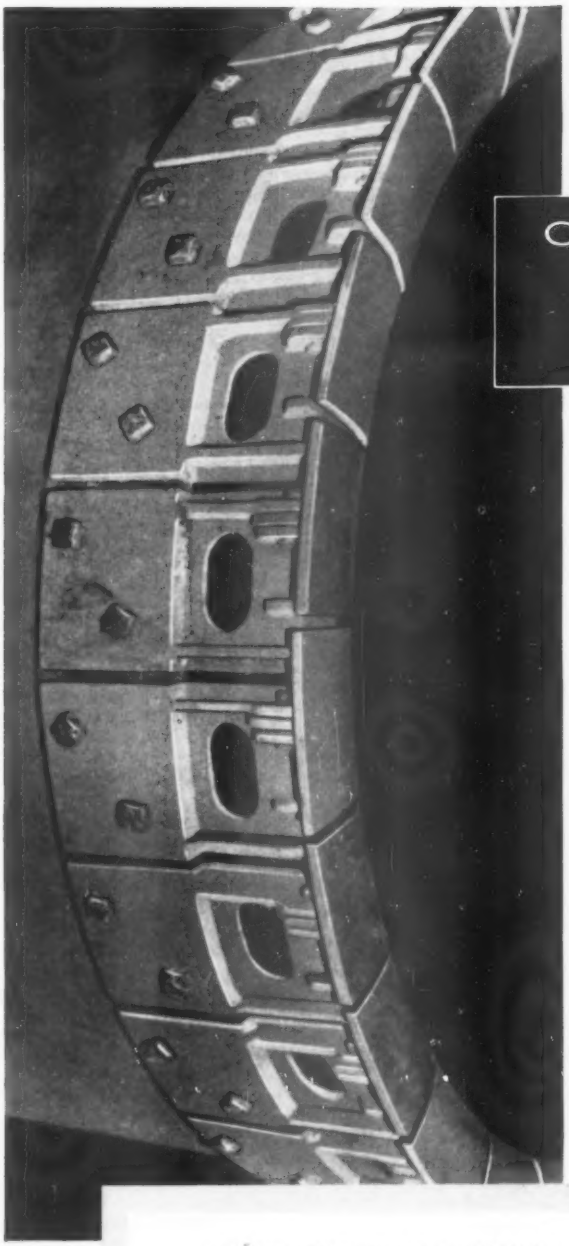
Harry L. Pinkerton, W. E. Anderson Sons Co., Columbus, gave a discussion and demonstration of "Two-Way Radio in the Ready Mixed Concrete Business," which was a timely discussion in view of the fact that the Federal Communications Commission only recently amended the rules governing the special industrial radio service, which now permits a company with an F.C.C. license, or one requesting a license, to operate its radio facilities inside all "standard metropolitan" areas where the population is not over 500,000, in connection with *all* projects being served.

After a brief discussion of the F.C.C.'s less stringent rulings and what it means to the industry, Mr. Pinkerton discussed the use of the industrial radio by his company during the past year and the benefits thus derived. He stated that about 18 months ago, the company decided to investigate thoroughly the possibilities of 2-way radio as to how it might improve the dispatching of the mixers and thereby improve customer service. As stated by Mr. Pinkerton, "We were losing control of our mixers after they left the plants. Time was being lost while the drivers located a phone to report mechanical or tire trouble. Shifting of mixers from one plant to another was not possible until the mixer returned to the plant from which it was originally loaded. These and other reasons were costing us yardage and poor service." It was decided that service could be improved and most other problems solved by the installation of the 2-way radio.

The complete installation includes a base station and a 100-ft. antenna mounted on top of one of the garage buildings, 37 units in mixer trucks, two units in expediter's cars, three units in salesmen's cars, one unit in the engineer's car, one unit in an official's car, and a subsidiary asphalt company has two radio-equipped cars. There is also a remote station in the mechanical garage for the use of the master mechanic. Cost of the installation was reported to be between $2500 and $3000 for the base station and antenna and approximately $600 for each mixer-truck or car unit.

Prior to using radios, the company had been experiencing some battery trouble, so to offset any additional drain on the battery, special-type generators were purchased for each mixer truck to produce more amperes to the battery even when the truck motor is idling. To date they have reportedly proven very successful.

(Continued on page 236)



SEGMENTAL KILN ENDS

CAST IN thermalloy*

Eliminate Warping . . . Reduce Downtime . . . Ease Replacement

You can lengthen the service life of your kiln when you order segmental kiln ends cast in Thermalloy, a high heat-resistant alloy.

Here's how you save time and money with Thermalloy segmental kiln ends. *Warping is greatly reduced because* (1) segmental design allows for expansion and contraction without permanent set of the kiln shell; (2) segments completely shield the kiln from clinker and flame leakage to a depth of 16½" back from the mouth of the kiln. *Installation is easier* because no special brickwork is needed. *One-man replacement* is made possible by the segmental design . . . the maximum weight to be handled at any one time is 35 lbs.

Call your nearest Electro-Alloys representative and let us show you how to save operating dollars with Thermalloy high alloy castings for kiln ends, feed ends, feed pipes, dampers and other applications in the cement industry. Free illustrated bulletin available upon request to Electro-Alloys Division, 4005 Taylor Street, Elyria, Ohio.

*Reg. U. S. Pat. Off.

VIEW FROM INSIDE KILN AT DISCHARGE END

Flush inside surfaces require no special brick work note countersunk bolts.

Clearance between segments allows for expansion and contraction.

Overlapping shield completely protects end of kiln.

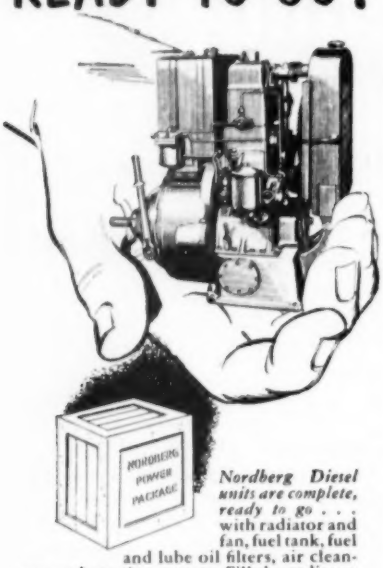
Kiln is protected by high heat resistant Thermalloy, to distance of 16½" back from mouth.

Shield casting protects kiln end from abrasion by clinker. Easily replaced by knocking out pins.

AMERICAN Brake Shoe COMPANY

ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO

Here's your
COMPLETE, COMPACT
NORDBERG
Diesel Engine . . .
READY TO GO!



Nordberg Diesel units are complete, ready to go . . . with radiator and fan, fuel tank, fuel and lube oil filters, air cleaner, and starting system. Fill the radiator, crankcase and fuel tank and you're producing reliable, low cost power . . . for power units on shovels, for crane magnets, for pumps in mines, quarries, and irrigation, for petroleum production pumping, for auxiliary generator sets ashore and afloat, for standby lighting units in manufacturing plants—and for hundreds of other power jobs.

Built in 1, 2, and 3-cylinder sizes from 10 to 45 hp, these heavy duty medium speed units are available as straight power units with stub shaft or clutch power takeoff—as generator sets producing from 6 to 30 K.W.—and as "packaged" centrifugal pumping units.

Send the coupon today for more details.

NORDBERG MFG. CO., Milwaukee, Wis.

NORDBERG
BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY DUTY DIESELS

MAIL THIS COUPON TODAY

Nordberg Mfg. Co., Milwaukee, Wisconsin

Send catalog covering Nordberg Type 4FS Diesels. I am interested in a unit for the following service:

_____

Your Name _____

Company Name _____

Address _____

City _____ Zone ____ State _____

4-353

The subject of maintenance was also briefly discussed. The company has entered into a contract with the equipment manufacturer to maintain all units at a rate of approximately $120 per unit per year. All radio repair work is done after working hours or on Saturday afternoons. No mixer truck is permitted to be idle because its radio is out of order.

The company operates 49 mixer trucks from eight batching plants located at six points throughout Columbus and Franklin Counties. All of the concrete orders are taken and dispatched from the central office. The drivers of mixer trucks equipped with radios advise the central office when they arrive on the job and also give pertinent information such as the speed the concrete will be unloaded, whether or not the quantity ordered will be sufficient to do the job, what the conditions are for getting into the site and when they may be expected back at the plant. Such information makes it possible to plan a more efficient work day. Plants can be closed earlier since other workers need not wait for a mixer truck to return to find out whether or not the job requires a finish load. The shifting of mixers from one plant to another can be done in a minimum amount of time, and maintenance men can be dispatched immediately upon report of mechanical or tire trouble. The office is also kept advised of any change in the consistency of the concrete, which information is immediately passed on to the plants for correction. Mr. Pinkerton also spoke of the psychological effect the radio system had on the drivers which, he said, "keeps them on their toes and reduces the number of stops that cause so much trouble in the dispatching of orders."

In concluding his report, Mr. Pinkerton stated that there was no way by which he could pin point the valuable results of the radio service other than the fact the plants can now put out more yardage easier, more efficiently and at the same time provide better service to the customers. The cost records, he said, show that it is costing seven to eight cents per minute to operate the mixer trucks and that depreciation and maintenance per radio unit is 75 cents per day, so by saving only ten minutes per day, the radio has already been paid for. In actuality, he reports that the company is saving a minimum of 30 minutes per day per mixer truck and in many cases much more.

African Lime Plant

AN INTENSIVE GEOLOGICAL INVESTIGATION for deposits of high-grade limestone in South Africa has been conducted during the past two years by The Central Mining & Investment Corp., Ltd., acting on behalf of The Northern Lime Co., Ltd., which is a company in the Central Mining-Rand Mines Group. Drilling tests have discovered a hitherto unknown high-grade limestone deposit near rail facilities at Silverstreams, about 100 miles west of Kimberley. The results of a borehole drilling program in this area are said to indicate that the quantity of first-grade limestone, on property over which Northern Lime Co. holds rights, is sufficient to satisfy South Africa's entire lime demand for many generations ahead.

Principal South African lime producers use the vertical shaft kiln almost entirely in which coal is intermixed with the limestone feed. This has been the method used for the past 30 years by Northern Lime Co. at its Taungs property. The company proposes, however, in the near future, to erect a modern lime-burning rotary kiln plant in the new Silverstreams area. This reportedly will be the first such installation in Africa. Capacity of the new plant, which is expected to be in operation sometime in 1954, will be in excess of 100,000 tons.

Predicts Optimistic Cement Future

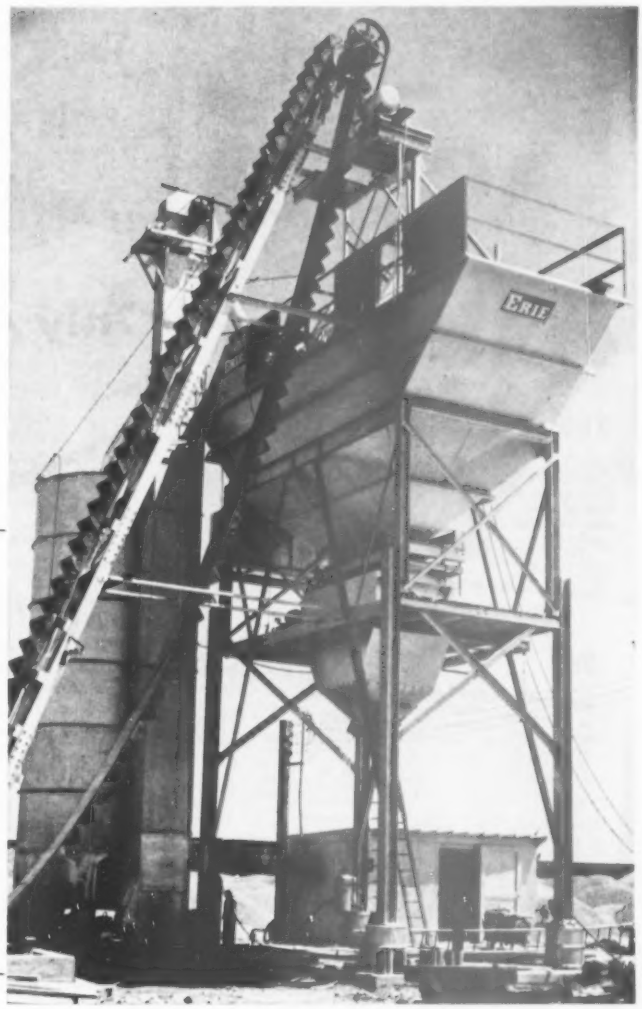
CRIS DOBBINS, president, Ideal Cement Co., Denver, Colo., as guest speaker at a recent Security Analysts meeting in San Francisco, Calif., predicted an optimistic future for the entire cement industry, and specifically for his company. Even if there is a national economic downturn, he believes the cement industry is in better shape to weather the storm than most other industries. He pointed to the great demands for highways, hospitals and schools as large markets for cement in the future. He believes another large outlet for cement will be its use in the construction of atomic-bomb shelters.

Ideal Cement Co. serves the Gulf Coast, Rocky Mountain area, and northern California and Oregon. Its Pacific Coast production was acquired through a merger with Pacific Portland Cement Co. early last year and, according to Mr. Dobbins, the merger has proved to be beneficial for the stockholders of both companies. The company produced about 20,000,000 bbl., or about 8 percent of the approximately 250,000,000 bbl. of cement produced in the United States last year. Shipments of Ideal Cement Co., for the first five months of this year, were said to be about 5,000,000 bbl. ahead of shipments for the same period in 1952, and profits are also ahead by $827,000, or about $0.50 per share.

Discussing the company's future plans, Mr. Dobbins stated that the company does not intend to disregard the possibility of a business recession, but that just now Ideal is "marking time" in an expansion and modernization program which has cost $37,000,000 since World War II. He stated, "We have plans on the board for projects in California, Texas, Montana and Colorado, but we are making no commitments until we can see more clearly what lies ahead."

WHY IRVING BROS. OF HARLAN, INDIANA DECIDED ON A SECOND ERIE PORTABLE TRUCK MIXER PLANT

5 YEARS EXPERIENCE WITH THEIR FIRST UNIT CONVINCED THEM THAT ERIE EQUIPMENT COULD BE COUNTED ON TO DELIVER AS "ADVERTISED"



This is Irving Brothers' new GTES-79 Erie bin and weighing Aggremeter. It's pre-assembled into large sections for easy, over-the-road hauling. No special labor is needed to set it up. And one man can operate it at full capacity, which is 125 yards of specification concrete per hour.

SOLD BY
KORTE BROS. • FORT WAYNE, IND.

In 1948, Irving Brothers Gravel Company bought an Erie Steel Construction Portable Unit for their Harlan, Indiana plant. That was 5 years ago.

This spring, Irving Brothers bought their second plant. The new plant just went into operation.

When the second order was placed, James Irving said, "The accurate dependable service and the short time it takes to erect Erie equipment are what prompted us to buy our second Erie plant."

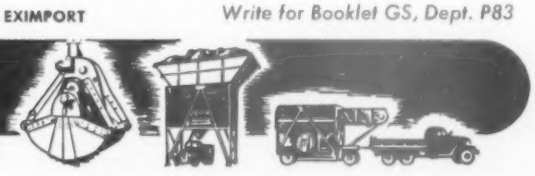
Important as it is, quick knock-down and set-up aren't the only advantages owners get out of their Erie plants. Other features are: accurate, central-plant capacity and fast service on parts.

If you're thinking about a portable batching and mixing plant, don't decide until you get the Erie story. Learn for yourself why most Erie owners repeat with Erie equipment.

ERIE
STEEL CONSTRUCTION COMPANY
3811 GEIST ROAD • ERIE, PENNSYLVANIA

Cable Address: EXIMPORT

Write for Booklet GS, Dept. P83



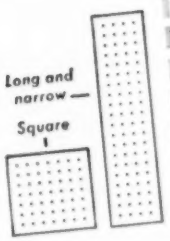
Cutaway view of Multiclone unit and Multiclone tube.

There are 4 things to look for In Dust Recovery Equipment

Only MULTICLONE has them all!

ONE

MAXIMUM ADAPTABILITY: Equipment that is adaptable to various installation requirements saves installation costs, saves space, provides greater operating efficiencies. Multiclone's adaptability is unequalled. It can be installed with side-inlet side-outlet, or side-inlet top-outlet . . . its shape can be varied (long and narrow, short and wide, or square) to fit different spaces . . . and its single-inlet single-outlet duct design permits greater flexibility and simpler installation.



TWO

SPACE-SAVING COMPACTNESS: Plant space costs money—so check space requirements carefully. Note in the accompanying chart how the Multiclone requires less cubic space than any other unit of comparable capacity and performance. Translate these savings into today's high costs for plant space and you readily see the vital importance of this one Multiclone advantage alone!

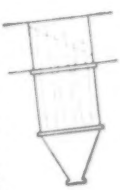
Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.8	3.9

THREE

HIGH RECOVERY: Multiclone's multiple small diameter tubes—made possible by its exclusive vane design—whirl the dirty gases with greater centrifugal force, thus throwing out not only the large, medium and small particles but also a high percentage of the extremely small particles of ten microns and less. This results in a more complete recovery of all suspended materials from the gas stream.

FOUR

MINIMUM MAINTENANCE: In the Multiclone there are no high speed moving parts to require repair or replacement . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. Draft losses in the Multiclone remain uniformly low at all times. Moreover, the recovered material from an entire bank of tubes is collected in a single hopper—much easier to service and maintain than the multiple hoppers of conventional cyclone units!



WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1006 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA

CHRYSLER BLDG., NEW YORK 17 • 1 N. La SALLE ST. BLDG., CHICAGO 2

1429 PEACHTREE ST. N.E., ATLANTA 5 • HOBART BLDG., SAN FRANCISCO 4

PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

The above features are by no means the complete story on Multiclone savings. Engineered by the same organization that pioneered the first commercial application of the Cottrell Electrical Precipitator, the Multiclone embodies the results of more than 45 years' experience in all phases of recovering suspended materials from gases. Before you install any recovery equipment, get all the facts on Multiclone advantages!

Send for Multiclone Booklet.

Tuffy Makes® Big Saving On Rock Crushing Job!

"Best Wire Rope Service . . . on 33 Draglines"

Says Superintendent of a Florida Rock Crushing Company.
(Name on Request)

This construction company learned, by actual in-use tests on 33 draglines in their plants, that Tuffy's extra flexibility, extra abrasive resistance and extra toughness helped cut dragline costs 40%! On their first test, Tuffy went 26 shifts against 19 shifts for another make . . . on the second test, Tuffy lasted 19 shifts, the other rope only 9! See for yourself how Tuffy Draglines can move more material for longer periods for *you!*

UNION WIRE ROPE CORP.
Specialists in Wire Rope and Braided Wire Fabric
2156 Manchester Ave., Kansas City 3, Mo.

Please send FREE illustrated folder on Tuffy Draglines.

*Firm Name*_____
*By*_____ *Title*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

C-15

MANUFACTURERS NEWS

Nordberg Mfg. Co., Milwaukee, Wis., announces the appointment of J. D. Grace as sales manager of the screen department of the crusher division. He has been manager of the advertising and sales development department for the past three years and will be succeeded in this position by R. E. Schulz, advertising assistant. A native of Wisconsin and a graduate of Marquette University, Mr. Grace joined the Nordberg firm in 1947 to do sales promotional work in the crusher division. Previously he was with Bucyrus-Erie Co. in a similar capacity.

J. D. Grace

Clark Equipment Co., Buchanan, Mich., has appointed the following distributors for Ross Carrier Co., straddle trucks and fork-trucks, which were recently acquired by the company: Glen L. Codman Co., Inc., San Francisco, and Robert H. Braun Co., Los Angeles, Calif.; R. E. Common Equipment Co., Peoria, Ill.; W. A. Marschke & Sons, Indianapolis, and Materials Handling Corp., South Bend, Ind.; Big River Equipment Co., Davenport, Iowa; Morrison Equipment Co., Grand Rapids, Mich.; Arst Equipment Co., Tulsa, Okla.; and Preston Faller, Seattle, Wash.

General Electric Co., Schenectady, N.Y., has announced the following appointments in the apparatus sales division: O. B. Falls, Jr., manager of electric utility sales; T. F. Mackey, manager of heavy industries sales; K. R. Ross, manager of medium industries sales; W. V. Gough, manager of light industries sales; H. R. Wallrath, manager of contractor and construction industries sales; A. H. Hemker, manager of farm, trade and services industries sales; H. D. Beale, manager of industry products maintenance; and F. W. McChesney, manager of industry sales procedures.

Mine Smelter & Supply Co., Denver, Colo., has announced the election of C. G. Willard as a member of the board of directors to succeed O. H. Johnson, who has retired but will continue to serve as honorary chairman of the board. Mr. Willard, who is manager of the Marcy mill division, has been associated with the firm for 35 years.

J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan., has announced the appointment of John Heimovics as executive vice-president. He was formerly an executive with the Jones-Hettelsater Construction Co., Kansas City.

Stearns Magnetic, Inc., Milwaukee, Wis., announces that Gordon E. Med-

Tuffy®

Stops Dozer Rope Waste

A Reel of Tuffy Dozer Rope Can Save Up to 300%

When 10' or so of Tuffy Dozer Rope is crushed or cut on the drum, don't throw the whole rope away. Just feed through enough to replace the damaged part! When you're using Tuffy, there is plenty of service left in the undamaged part. You get 6 to 9 cuts from one reel and, figuring roughly, there are *two* dozer ropes to *each* reel of Tuffy. That gives you an approximate ratio of 6 to 2 . . . around 300% increased service! And you can have your dozer back on the job in less than *half* the time usually needed! Tuffy ½" Dozer Rope is now furnished in 150' reels. Write today for simple details on how to mount Tuffy on *your* Dozer!

MAIL COUPON TODAY

UNION WIRE ROPE CORP.
Specialists in Wire Rope and Braided Wire Fabric
2156 Manchester Ave., Kansas City 3, Mo.

Please send me the FREE illustrated folder on Tuffy Dozer Rope.

*Firm Name*_____
*By*_____ *Title*_____
*Address*_____
*City*_____ *Zone*____ *State*_____

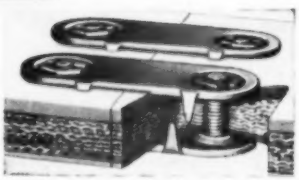
C-14

FLEXCO

BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

- ★ FLEXCO Fasteners make tight butt joints of great strength and durability.
- ★ Trough naturally, operate smoothly through take-up pulleys.
- ★ Distribute pull or tension uniformly.
- ★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
- ★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.



Compression Grip distributes strain over whole plate area

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO., 4684 Lexington St., Chicago 44, Ill.

PYRASTEEL

SEGMENTAL KILN ENDS FOR CEMENT PLANTS

. . . proven satisfactory in THOUSANDS of Installations

Avoid burnouts and shutdowns, and insure years of continuous service, by equipping your kilns, both feed and discharge ends, with PYRASTEEL Segmental Kiln Ends.

PYRASTEEL is equally effective and economical in many other high-heat applications, including clinker coolers, conveyor screws, feed pipes, and drag chains.

Over three-quarters of the annual cement output is produced in plants using either or both of our alloys, PYRASTEEL and EVANSTEEL.

PYRASTEEL KILN END, Discharge end

Unit Segments are easy to install or replace

Write for PYRASTEEL Bulletin

CHICAGO STEEL FOUNDRY CO.

Kedzie Avenue and 37th Street • Chicago 32, Illinois

Makers of Alloy Steel for Over 40 Years

lock has been appointed sales manager. He was formerly assistant sales manager.

LeRoi Co., Milwaukee, Wis., has announced the formation of a new division for the manufacture of front end loaders and truck-mounted mixers. N. M. Sedgwick, formerly general sales manager for the construction and mining division, has been appointed general manager of the new division, which will be known as the Le Roi-Transo division. W. D. Lund, formerly assistant to the general sales manager of the construction and mining division, is assistant general manager of the new division. R. H. Rodolf, formerly manager of rock drill sales for the Cleveland rock drill division, succeeds Mr. Sedgwick as general sales manager of the construction and mining division. C. L. Meigs has been named manager of portable compressor sales, and A. J. Jensen has been made assistant to the general sales manager of the construction and mining division. Front end loaders in ½-cu. yd., 1-cu. yd. and 1½-cu. yd. capacities will be manufactured at Coldwater, Mich., and the 3-cu. yd. to 6-cu. yd. mixers will be produced at Dunkirk, Ohio. The loaders and mixers have been added to the line of construction and mining equipment in order to offer construction equipment users a more complete range of products.

N. M. Sedgwick

W. D. Lund

R. H. Rodolf

Raybestos-Manhattan, Inc., Passaic, N. J., announces that S. R. Zimmerman, Jr., has been elected a director of the company. He is assistant general manager of the United States asbestos division.

Bemis Bro. Bag Co., St. Louis, Mo., has announced the appointment of A. F. G. Raikes as manager of the New York general sales division. He was formerly assistant director of sales in the St. Louis office and will be succeeded in this position by C. W. Akin, supervisor of paper bag sales.

Walsh Refractories Corp., St. Louis, Mo., announces that Paul L. Hershfield has been elected president of

REED CRUSHED STONE CO.

GILBERTSVILLE, KENTUCKY

reports . . .

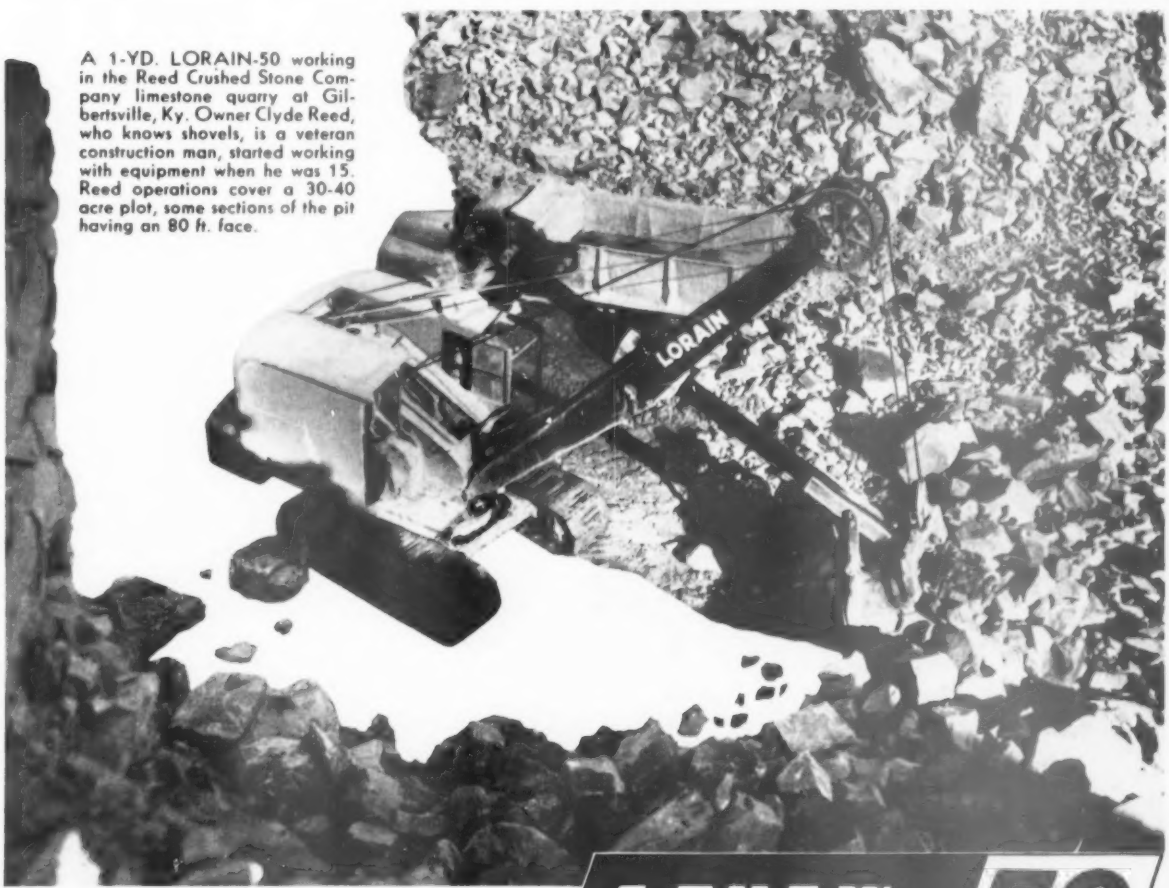
"If that LORAIN-'50' wasn't the best available, I wouldn't have it. It has stood up well in tough material . . . very minor repairs."

Here's a quarry operator that demanded the best — and got it! It's a 1-yd. Lorain-50 shovel. The work was tough, steady digging 10 hours a day in heavy limestone. Pieces of shot rock average 1 to 3 ft. in size, yet the "50" averages 160 yards an hour. The production of this plant goes to counties, construction companies and governmental projects in the surrounding area, including the new Atomic plant west of Paducah.

To satisfy their demand for the best 1-yd. shovel which would withstand tough digging, Reed Crushed Stone Company got these performance features, among others, in their Lorain-50. Shock-absorbing Hydraulic Coupling that reduces wear and tear on turntable mechanism and cables, the engine never stalls under any digging conditions . . . air controls available to lessen operator fatigue and increase daily yardage . . . center drive turntable construction to transmit power most directly to the dipper . . . plus "balanced quality" of all parts and design that has made Lorains outstanding for over half a century.

If you want "the best" in a 1-yd. shovel, be sure to investigate the Lorain-50. Ask your near by Thew-Lorain Distributor to show you a "50" in action and give you complete information.

THE THEW SHOVEL CO., LORAIN, OHIO



A 1-YD. LORAIN-50 working in the Reed Crushed Stone Company limestone quarry at Gilbertsville, Ky. Owner Clyde Reed, who knows shovels, is a veteran construction man, started working with equipment when he was 15. Reed operations cover a 30-40 acre plot, some sections of the pit having an 80 ft. face.

THE PREFERRED NAME IN SHOVEL-CRANES

THEW LORAIN 50 SERIES

NOW!

THE

DYNACLONE®

PATENTED

The ULTIMATE in Dust Filters

❶ CONSTANT SUCTION
AT DUST SOURCES

❷ SELF CLEANING
FOR CONTINUOUS OPERATION

❸ NO AUXILIARY MOTORS OR BLOWERS
(THE MAIN OPERATING FAN DOES THE CLEANING)

❹ NO ABRASION OF BAGS BY THE CLEANER

The traveler (T) is open to atmosphere by means of a 4-inch flexible hose. As the traveler contacts the open end of each bag, the negative pressure which exists in the dust chamber draws a blast of air (from the atmosphere) through the bag to thoroughly clean it.

Each bag is cleaned, on an average, once every five minutes, thereby assuring uniform suction at dust sources.

The Dynaclone has now been in operation in many different industries for the past three years. More than half of present orders are from the same customers.

SEND FOR BULLETIN . . .

NO. 102

THE W. W. SLY MFG. COMPANY
4746 TRAIN AVENUE • CLEVELAND 2, OHIO
New York • Chicago • Philadelphia • Syracuse •
Detroit • Buffalo • Cincinnati • St. Louis •
Minneapolis • Birmingham • Los Angeles • Toronto

SLY PIONEERS & LEADERS in INDUSTRIAL DUST CONTROL

the company, replacing J. L. Crawford, who has resigned. Mr. Hershfield is also chairman of the board and president of the Mississippi Glass Co. A. J. Tomasek has been promoted to the office of executive vice-president. John J. Duggan has been appointed sales manager, Glass Refractories, and W. J. Schweickhardt has been made sales manager of General Refractories. Thomas W. Gill has been re-elected secretary-treasurer.

Sprague & Henwood, Inc., Scranton, Penn., has named James A. Ross as chairman of the board. Adrian E. Ross, formerly assistant to the president and chief engineer, has been elected president of the company, and William J. Schank, formerly vice-president, has been made senior vice-president and general manager.

Shield Chemical Corp., Verona, N. J., has announced the appointment of Frank J. Enerson as sales engineer for Drycrete and Masticote waterproofing.

Rollway Bearing Co., Inc., Syracuse, N.Y., announces that John D. Williams has been elected vice-president and general manager, succeeding William B. Smithers, who has resigned.

United States Rubber Co., New York, N.Y., has announced the appointment of Chester M. Boehm as manager of sales policy, mechanical goods division.

Crown Zellerbach Corp., San Francisco, Calif., has appointed J. H. McMillen as assistant manager of multiwall bag sales. He was formerly West Coast sales manager of the multiwall bag division of St. Regis Paper Co.

Hendrick Mfg. Co., Carbondale, Penn., has announced the election of Kenneth H. Colville, Jr., to the board of directors. A great grandson of Eli E. Hendrick, founder of the company, Mr. Colville has been associated with the firm since 1940.

Chicago Steel Foundry Co., Chicago, Ill., has appointed Holmes & Stone, Houston, Texas, as representative for the state of Texas.

Union Bag & Paper Corp., New York, N.Y., has opened a sales office in Kansas City, Mo. B. J. O'Hearn, southwestern district manager for multiwall bag sales, and W. H. Burget, multiwall bag sales representative, will have their headquarters in this office.

Smith Engineering Works, Milwaukee, Wis., has established the Charles F. Smith memorial scholarship at Beloit College. The award will be given in one $500 or two $250 scholarships to Beloit students from the Milwaukee area.

Nordberg Mfg. Co., Milwaukee, Wis., has appointed the King-Knight Co., San Francisco, Calif., as distributor for the 4FS diesel engines in central and northern California.

Meet and Beat Competition

with

WHEELER *Capacity*

WHEELER *Speed!*

Here's the 51 hp MM UTIL WHEELER feeding aggregate into asphalt mixing plant. Owner says UTIL shuttle gear lets him double his loading speed.

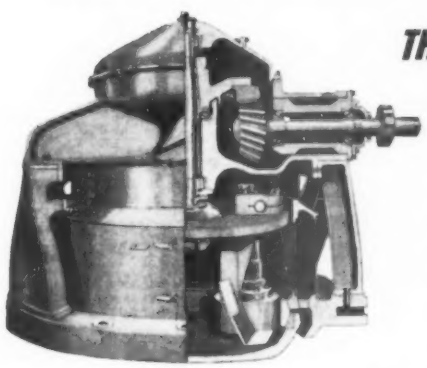
MM maneuverability lets Wheelers work in tightest spots. Handling ease cuts operator fatigue, boosts operator efficiency.

Streamline loading, stockpiling, clean-up jobs . . . move large loads over rough, unpaved yards at high speed! Handle all load shapes and sizes in less time with easy-steering, heavy-duty MM Wheelers. On every job, MM Wheelers are *money-makers*. They're lower in first cost because MM high-production cuts manufacturing costs. Extra speed and capacity hold down operating costs, help you show a *better* profit job-after-job.

If you're checking your expenses closer these days, *compare* MM Wheelers against the field. Check for *power, speed, capacity, price*. Try the Wheelers for performance and ease of operation. See for yourself why more and more companies call MM Wheelers the *leaders* in industrial loader value.

MINNEAPOLIS-MOLINE MINNEAPOLIS 1, MINNESOTA

BRADLEY HERCULES MILLS



THE QUICKEST AND MOST ECONOMICAL WAY TO INCREASE YOUR GRINDING CAPACITY

For the cement manufacturer with excess kiln capacity—operating compartment mills—the installation of BRADLEY HERCULES MILLS as preliminary pulverizers and converting the compartment mills to straight tube mills will result in INCREASED CAPACITIES of uniformly ground fine materials at an APPRECIABLE SAVING IN HORSE POWER. Automatic Control eliminates manual operation.

Investigate the new HERCULES MILL, a moderate priced mill, that can be installed in practically any existing plant at GREAT SAVINGS in horse power with increased capacities. A RUGGED MILL—designed for MAXIMUM ACCESSIBILITY—the use of new wear-resisting metals ASSURES CONTINUITY OF OPERATION.

WRITE FOR CATALOG NO. 60

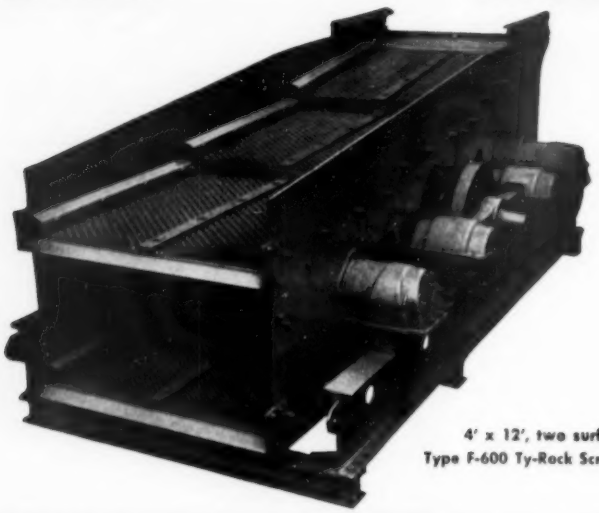
BRADLEY PULVERIZER CO.

ALLENTOWN, PENNSYLVANIA

YOU CAN DEPEND ON

TY-ROCK SCREENS

BALANCED RUGGED



4' x 12', two surface
Type F-600 Ty-Rock Screen

THE W. S. TYLER COMPANY
CLEVELAND 14, OHIO
Manufacturers of Woven Wire Screens and Screening Machinery

Gardner-Denver Co., Quincy, Ill., announces that A. G. Lindquist has been elected a director in addition to his duties as secretary and comptroller. A. H. Jones, director of exports, has been named vice-president. Other appointments are C. M. George as sales administrator; O. C. Knapheide, Jr., sales manager, oilfield and industrial division; C. H. Rieman, sales manager, mining and contracting division; J. R. Affre, sales supervisor of oilfield and industrial division; E. A. Linneman, sales supervisor of the contracting division; and J. A. Caverly, sales supervisor of the mining division.

Westinghouse Electric Corp., Pittsburgh, Penn., has announced the following elections: Bruce D. Henderson, vice-president in charge of purchases and traffic, to succeed Andrew H. Phelps who has retired; William C. Rowland, vice-president in charge of manufacturing and repair division; Franklin L. Snyder, assigned to staff of L. E. Osborne, executive vice-president of defense products divisions; C. Swan Weber, vice-president in charge of Washington office; Robin S. Kersh, vice-president in charge of eastern district; and Leslie E. Lynde, manager of aviation gas turbine division, succeeding Mr. Snyder.

Williams Patent Crusher & Pulverizer Co., St. Louis, Mo., has appointed Schuyler A. Palmer, Pasadena, Calif., as sales representative for Arizona and southern California.

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___Belting, Conveyor, Elevator, Power Transmission
___Belting, V-type
___Belt Repair Equipment
___Bin Level Indicators
___Bins and Batching Equipment
___Bits
___Blasting Supplies
___Block Machines, Concrete Building
___Bodies, Trailer
___Brick Machines and Molds
___Buckets
___Bulk Cement Handling Equipment
___Bulldozers
___Cars, Industrial
___Central Mixing Plants
___Classifiers
___Clutches
___Coal Pulverizing Equipment
___Concentrating Tables
___Concrete Forms
___Concrete Mixers
___Concrete Mixing Plants
___Concrete Specialty Molds
___Concrete Waterproofing and Dampproofing
___Conveyors
___Crushers
___Coolers
___Cranes
___Curing Equipment
___Derricks
___Dewatering Equipment, Sand
___Diesel Engines
___Dragline Cableway Excavators
___Draglines
___Dredge Pumps
___Drilling Accessories
___Drills
___Dryers
___Dump Bodies
___Dust Collecting Equipment & Supplies
___Electric Motors
___Engineering Service, Consulting and Designing
___Explosives & Dynamite
___Fans and Blowers
___Feeders
___Fifth Wheel, Heavy Duty Special
___Flotation Equipment
___Front End Loaders
___Gasoline Engines
___Gear Reducers
___Generator Sets
___Grinding Media
___Gypsum Plant Machinery
___Hard Surfacing Materials
___Hoists
___Hoppers
___Kilns: Rotary, Shaft, Vertical
___Locomotives
___Lubricants
___Magnetic Separators
___Masonry Saws
___Mills
___Pipe
___Pumps
___Scales
___Screen Cloth
___Screens
___Scrubbers: Crushed Stone, Gravel
___Shovels, Power
___Speed Reducers
___Tanks, Storage
___Tires and Tubes
___Torque Converters
___Tractor Shovels
___Tractors
___Trailer Dump Bodies
___Trucks, Bulk Cement
___Trucks, Industrial
___Trucks, Mixer Body
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If equipment you are in market for is not listed above, write it in the space below.

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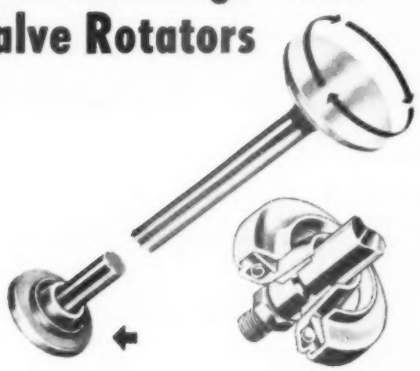
last even longer with Valve Rotators



Now with the addition of valve rotators, dependable Allis-Chalmers engines give even better service . . . provide even higher efficiency.

The device, known as the ROTO-CAP, gives the valve a small, positive turn each time it starts to open. This constant rotation eliminates sticking valves, face deposits and burning . . . increases valve life three to five times . . . keeps your engine on the job with full power for many added hours.

Rotators are standard equipment on the Model B-125 and Model W-201 power units. They also can be installed easily and at low cost on any of the other Allis-Chalmers Power Units. For more power, at lower cost see your Allis-Chalmers Dealer.

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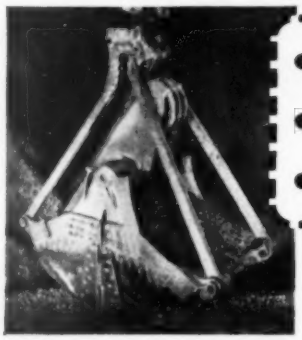
DESIGNED FOR HANDLING



- CEMENT CLINKER
- LIMESTONE
- GYPSUM ROCK

For complete information, construction details and specifications . . . WRITE FOR BULLETIN 2378

BLAW-KNOX Buckets are built especially for low-cost handling of bulk materials in cement plants. Tight fitting lips of cast chrome-nickel-molybdenum alloy steel prevent leakage and resist abrasion to insure long dependable service. Available in a wide selection of capacities and weights to get the most from your crane.

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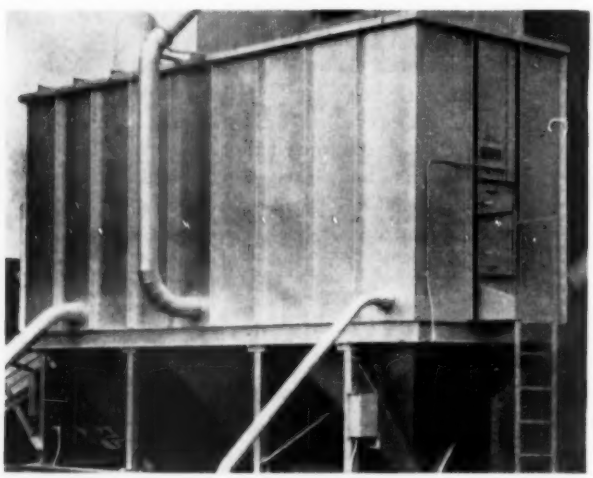

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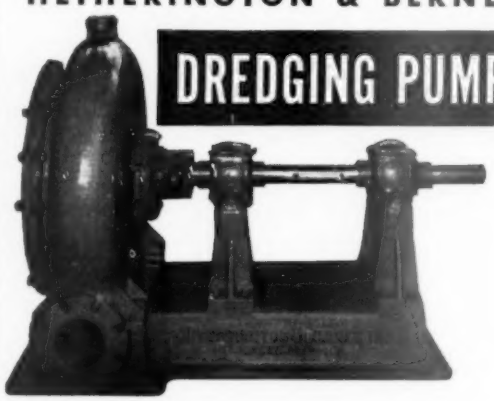
DREDGING PUMPS



performance-proven on the toughest jobs

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Hetherington & Berner sand and gravel pumps are available in two general types: *STANDARD*, (4", 6" and 8" sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and *DREADNAUGHT*, (6", 8", 10", 12" and 15" sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions.

Write for Bulletin DP-147.

HETHERINGTON & BERNER INC.

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ROCK PRODUCTS
at **ROCK-BOTTOM COST**

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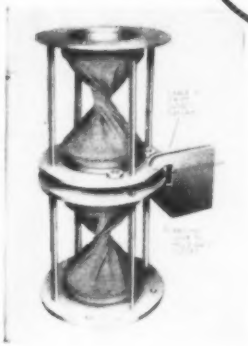
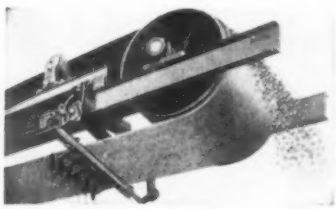


"TWISTITE" BIN VALVES
For dust-tight, dribble-proof bin flow control of both lump and fine materials. Rubber sleeves twist for a tight seal, by means of either hand or motor control, local or remote. When gate is open the two rubber sections, joined by a rotating collar, allow free flow. Write for Bulletin 254-A.

S-A BELT CONVEYORS
Engineered and built to withstand heavy duty service in moving large volumes of materials at low cost per ton. Available in a wide variety of sizes and arrangements—to meet specific operating conditions. Ask an S-A engineer for full details, or write for Catalog 146.



CONVEYOR BELT CLEANER
Pays for itself by prolonging belt life. Removes wet or dry material, leaving surface of belt clean and dry. Installs easily on any belt conveyor. No moving parts—no power is required. Write for Bulletin 651.

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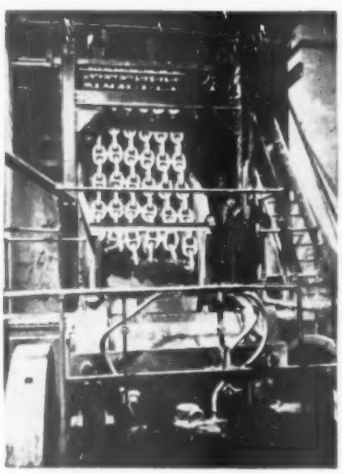

ROSS CHAIN FEEDERS

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FAST BUCKET OPENING SPEEDS OPERATIONS

• Double-hinge construction on Wellman's multiple-rope bucket permits faster opening than a single hinge. This speeds up operations, also gives a bigger spread in the open bucket for the same headroom.

Wellman's welded-design buckets offer you better performance and longer service. In all types and sizes you'll do better with Wellman!

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STONE AND WOOD GRABS

THE WELLMAN ENGINEERING COMPANY
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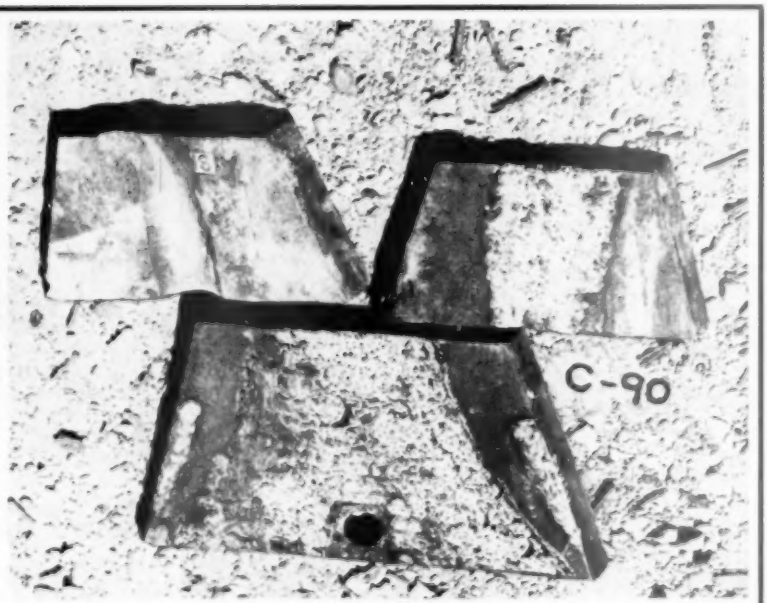
Rebuild Cheek Plates With N. M. MANGATONE



It is true that cheek plates do not cost a lot of money but they continually require replacement. Surprising sometimes how many sets are purchased yearly.

Here is an opportunity to put the finger on another of those little expenses which add up during the year.

Call this to the attention of our field man and he can show you how to cut this expense SQUARELY IN HALF.

RESISTO-LOY CO. *Manufacturers*
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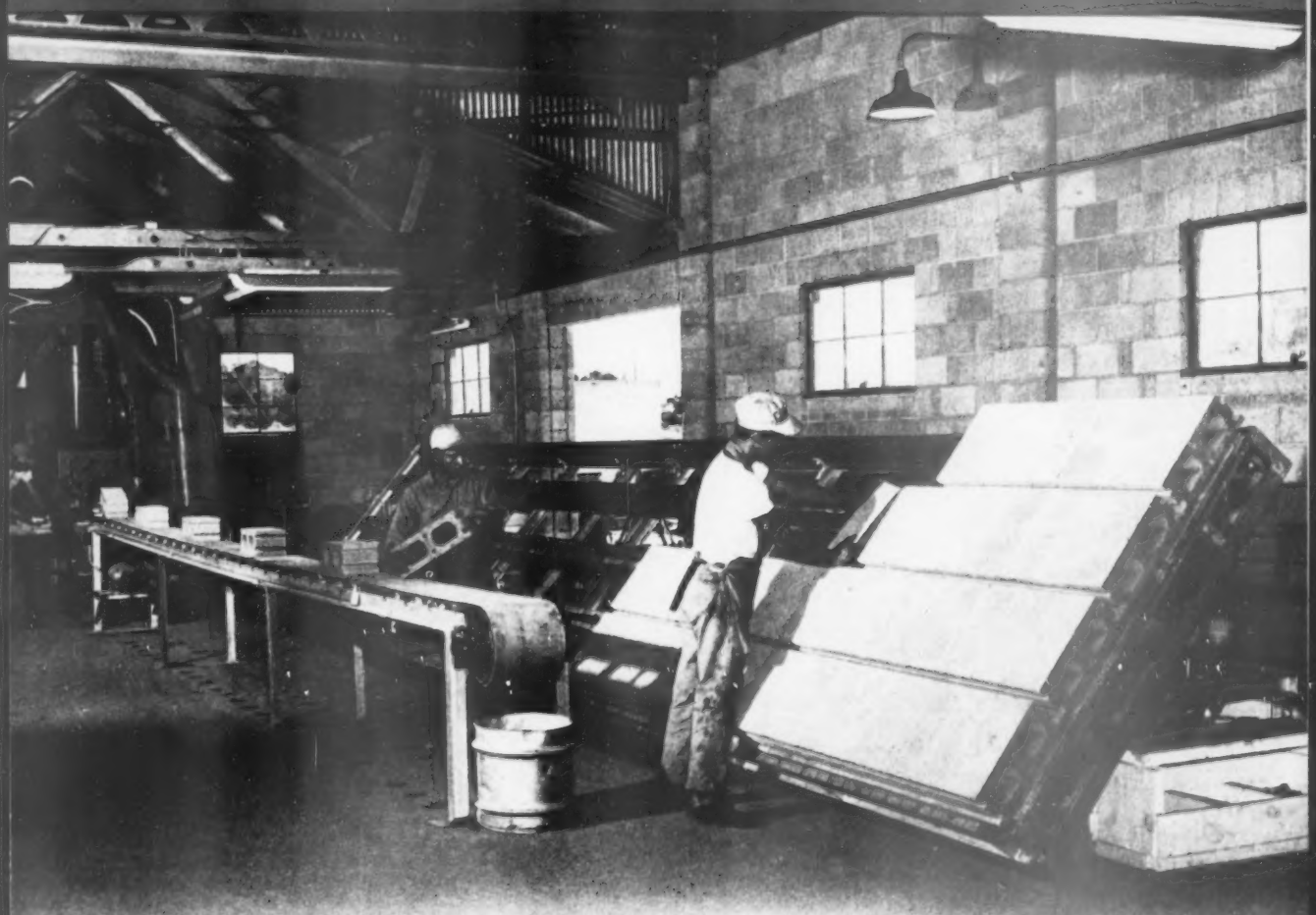
CONCRETE PRODUCTS

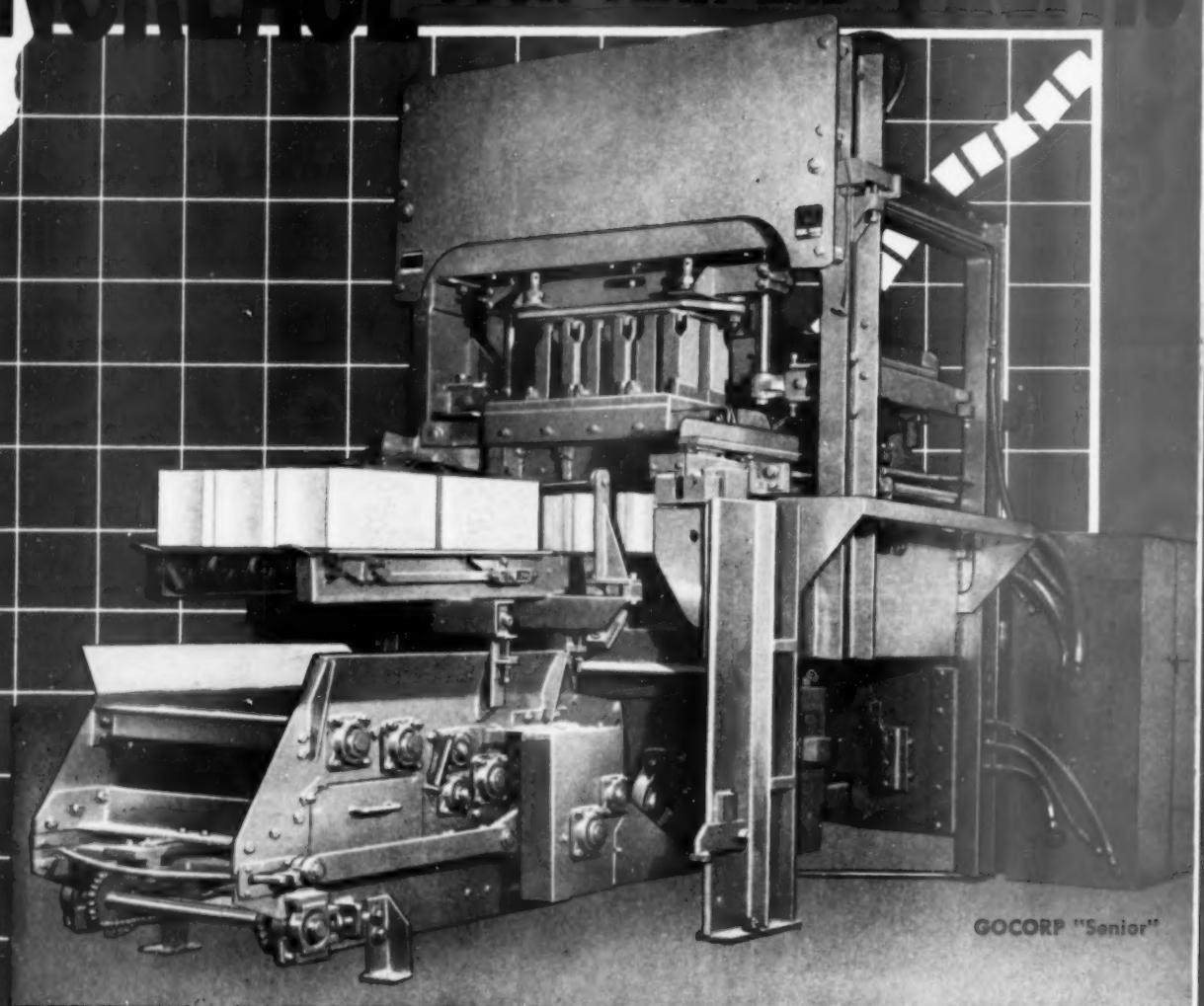
A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE



Strestcrete Concrete Products Plant of Atlas Building Products Co., El Paso, Texas

INCREASE YOUR YEAR END PROFITS



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with a GOCORP

Because GOCORP Plain Pallet Machines (The King—6 at a time or the Senior—3 at a time, illustrated) mean ✓ a quality product ✓ [illegible] ✓ repeat orders ✓ quantity production for lower *unit* production costs ✓ reduced maintenance and uninterrupted production allowing you to keep the profits you've made.

AND with a GOCORP there's no fear of obsolescence.

For complete information on plain pallet machines, batch mixers (12 to 75 cubic foot capacity), pipe and tile machines, or junior cored pallet block machines write or phone today.

HERE'S HOW GOCORP DOES IT—

- **Direct Feed** from main supply hopper to mold (no old fashioned feed drawer) plus intense vertical vibration (pallet clamped to mold) assures a uniformly dense unit.
- **Sequence Operation** for easy adjustment and greater production. Under Machine Pallet Return—saves space and reduces labor costs with one man operation.
- **Hydraulic Drive**—Smooth trouble-free performance—reduces maintenance. GOCORP'S Johnny-on-the-spot factory trained men for help when you need it.
- **Advanced Design** gives you "Tomorrow's machine today."

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407 Grace Street Adrian, Michigan

INDUSTRY NEWS

Concrete Institute

THE AMERICAN CONCRETE INSTITUTE announces that its southwest regional meeting will be held at the Rice Hotel, Houston, Texas, October 29-30, 1953. Major emphasis of the meeting will be on concrete construction practices and techniques.

Program highlights will include such topics as prestressed lightweight concrete, lightweight concrete used in oil refineries and chemical plants, shearing strength of anchor bolts embedded in concrete, cardboard "pans" for concrete floors, lightweight concrete for slabs-on-ground, and prestressed concrete piles.

Co-chairmen of the meeting are Prof. Phil M. Ferguson, Department of Civil Engineering, University of Texas, and John A. Murlin, Texas Concrete Products Corp., Austin, Tex.

Block Plant

WALTER C. BROWN AND VANCE E. KROEBER, Napoleon, N.D., have started operation of a concrete block plant at Mandan, N.D., which will be operated under the name of Western Concrete Products. The plant is located near the recently established Molite plant which will supply expanded shale aggregate for the block plant.

Mr. Brown also operates the Napoleon Sand & Gravel Co., plant at Napoleon, which operation also includes the production of block.

Buys Concrete Firm

THE TONNE CO., Hancock, Mich., recently announced the purchase of The Concrete Products Co., also of Hancock. Lyle P. Tonne, head of the company, has been in the engineering and construction field for the past 25 years. The company plans to produce ready-mixed concrete, concrete block, lintels, chimney block, caps and other concrete products.

Concrete Pipe School

THE AMERICAN CONCRETE PIPE ASSOCIATION has announced that its third annual short course school of instruction will be held September 10-12, 1953, at the Sherman Hotel, Chicago, Ill., under the direction of John G. Hendrickson, Jr., association research engineer. Instructors will include representatives of the Portland Cement Association and the National Sand and Gravel Association, as well as concrete pipe industry experts.

Subjects to be covered in the course include: Design of Non-Plastic Concrete Mixes; Pozzolans; Wetting Agents; Air-Entraining Agents; Calcium Chloride and Hydropel as Admixtures; Aggregate Characteristics and Their Influence on Concrete; The Influence of Curing Procedures on Concrete; Methods of Vibrating Mixes and Their Advantages; Joints for Minimum Infiltration; and Manufacture and Maintenance in a Concrete Pipe Plant.

President Ivy H. Smith of Jacksonville, Fla., will address the group and introduce various speakers. Group participation will be encouraged by the use of three panel discussions, one of which will include P.C.A. and N.S.G.A. representatives. An all-industry panel will discuss manufacturing problems on the final day.

In addition to the scheduled sessions, several manufacturers will exhibit their products, varying from wire cutters and rubber gaskets to steam-curing generators and tractors.

Concrete Block Plant

A CONCRETE BLOCK PLANT has been established at Atlanta, Ga., for the production of "Mingotile" block which has a multi-color, stone-like surface, applicable for interior or exterior work. Freezing and thawing tests reportedly showed no separation of the facing from the block or cracking in temperatures of 15 deg. F. below zero. The block are produced in standard sizes and shapes.

Cover Picture

ATLAS BUILDING PRODUCTS CO., El Paso, Texas, has shown rapid growth in recent years, and has expanded its line of products to include Strestcrete beams, slabs, and other reinforced units as well as block. A complete sales and engineering organization has been set up to promote sales and provide service to contractors. The cover illustration this month shows Strestcrete manufacture.

E. M. Wakeman & Associates, concrete and material handling equipment distributor in Florida, Alabama and Georgia for Columbia Machine Works of Vancouver, Wash., makes sales contacts and gives quick and efficient service to its customers by use of service trucks and airplanes

WAKEFIELD READY MIXED CONCRETE CO., Wakefield, Mass., has been sold to Rocco Schelzi, Edward Hogan, Dominick Schelzi and Louis DeMaio, Woburn, Mass. Plant facilities include bins, belt conveyor system, elevator, batching plant, heating plant, office building, garage and 15 transit-mixer trucks. Rocco Schelzi is general manager and Louis DeMaio is superintendent.

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, is establishing a concrete pipe plant in Irwindale, Calif., which will be its first plant on the west coast. The plant will produce high-pressure concrete irrigation or drainage pipe in various sizes. Henry Wiegand, formerly associated with United Concrete Pipe Co., is head of the new west coast operation.

ATLANTIC CONSOLIDATED BUILDERS SUPPLY CO., Jacksonville, Fla., dealer in cement, sand, aggregates and related materials, is building a $500,000 plant and warehouse on a 7-acre tract in the center of Jacksonville. New facilities will include a concrete block and ready-mixed concrete plant. Herbert M. Smullian is president and principal owner.

CAST-O-STONE CORP., St. Louis, Mo., has granted a franchise to Harry Dunn and Robert E. Hill of Columbus, Ohio, to produce Cast-O-Stone building block. The block is made of colored crushed quartz for decorative effect. The Ohio plant will be operated under the name of Cast-O-Stone Columbus Co.

LOCK JOINT CONCRETE PIPE CO., East Orange, N.J., recently announced plans to build a concrete pipe plant at Rochester, N.Y. Initial cost of the plant will be approximately $150,000. Upon completion of initial construction, plans were made to double plant capacity.

TINDEL MATERIAL CO., Watonga, Okla., has completed a new ready-mixed concrete plant. W. E. Tindel, Jr., owner, has operated a sand and gravel plant at Geary, Okla., which will continue in production.

ANCHOR CONCRETE PRODUCTS, INC., Buffalo, N.Y., has started on a $425,000 expansion program which will include the installation of equipment for high-pressure steam curing of concrete block.

G. A. REIDLAND, Crosby, Texas has purchased the machinery, supplies and lease of General Concrete Products Co., Baytown, Texas.

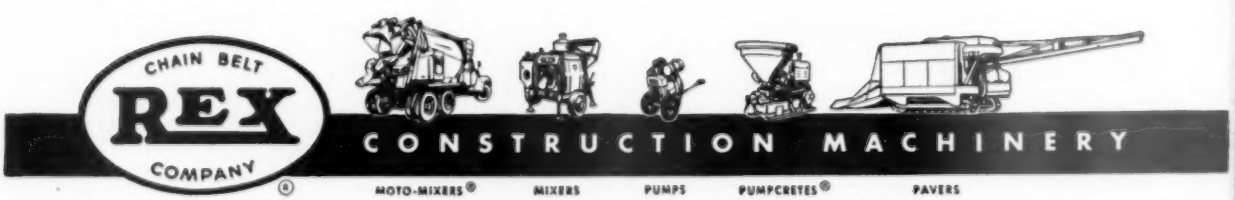
MARTIN CONCRETE PRODUCTS CO., Coffeyville, Kan., has purchased the Long-Bell ready-mixed concrete plant, also of Coffeyville.

TRANSMIX CONCRETE OF ROCKDALE, Austin, Texas, has increased its capital stock from $5000 to $15,000.

BAUGHAN CONSTRUCTION CO. has opened a ready-mixed concrete plant at Luray, Va.

STOP
LOOK
LISTEN

The Great NEW Rex 4½-Yard Adjusta-Wate Moto-Mixer



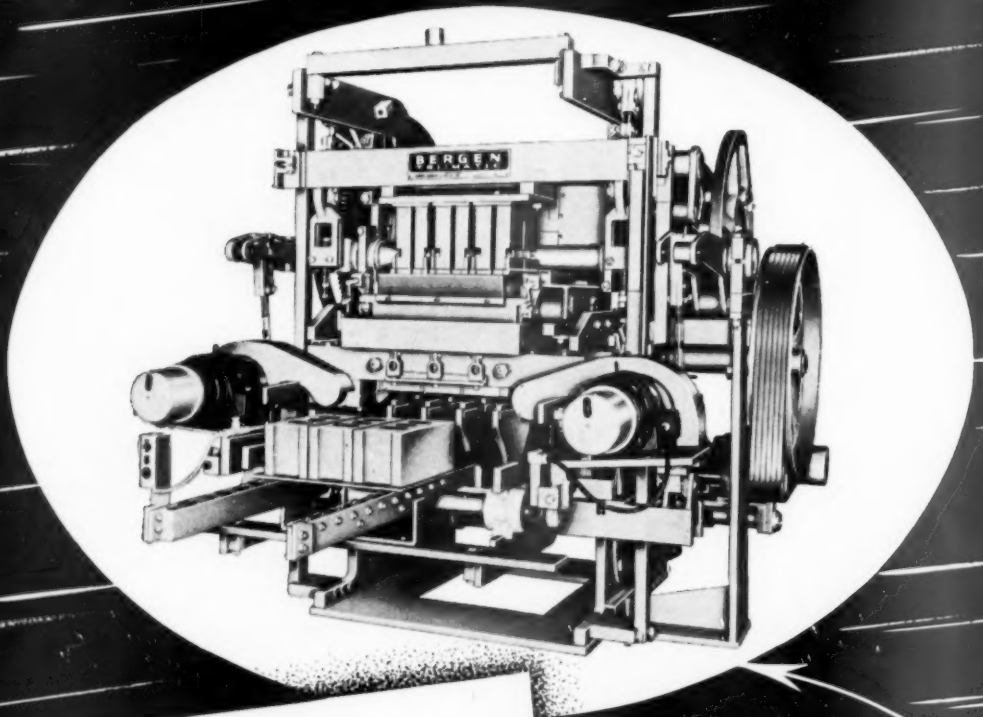
CHAIN BELT COMPANY • 4649 W. Greenfield Ave., Milwaukee 1, Wis.

in at your Rex Distributors

at the great *new* Rex 4½-Yard Adjusta-Wate Moto-Mixer®

to the *facts* he has to tell about the *low weight, biggest legal payloads, low operating and maintenance costs* of this new addition to the Rex line of profit-making Adjusta-Wate Moto-Mixers.

1,000... 8" BLOCK per HOUR



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Operates **CONSISTENTLY** Near 100% Efficiency

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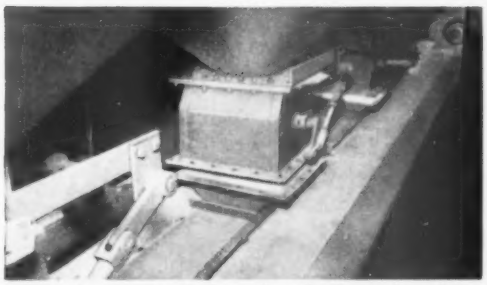
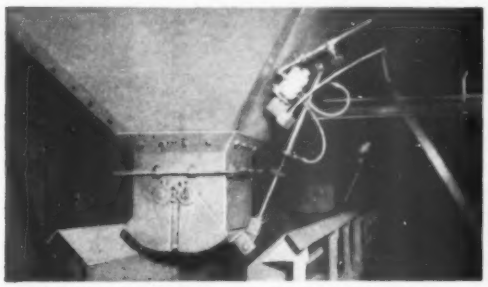
ANOTHER LEVITTOWN and ANOTHER HELTZEL



Heltzel patented tubular valve eliminates jamming, has pin-point accuracy.



Double clamshell remote control aggregate gate adjustable to control speed.

Levitt's third Heltzel plant promises new concrete batching records for leading city builder.

famous city builder sets third HELTZEL plant into operation at fabulous Bucks County development

Down in Bucks County, Pennsylvania, William J. Levitt, head of the city building firm that bears his name, recently set into operation his third Heltzel concrete batching plant. The fact that his two previous Heltzel plants set record-smashing production records convinced him of Heltzel's ability to produce.

In fact, the first plant played a big part in helping him astound the construction world with his Long Island Levittown. It batched concrete on an average of 1800 cubic yards per day, and on occasion rang up amazing 2,000 yard plus days. His second Heltzel plant was used mainly in the construction of concrete blocks, and untiringly kept pace with the fastest concrete block production on record.

Clean line, all-welded A-frame comes completely assembled, easy to erect.

This new Heltzel plant promises even greater things. It's completely integrated—from supply hoppers to conveying equipment to automatic batcher—it's completely designed and built by Heltzel to give Levitt the nation's most efficient concrete batching. Its capacity is an astonishing 300 cubic yards per hour, it's fully automatic with high speed electronic batching that is accurate to the fraction of a pound; the entire operation is controlled from a central control area, and it bristles with many other new Heltzel exclusives that put an end to guesswork and human error in concrete batching.

Portable or stationary, large or small—if you want the finest in modern batching equipment get the Heltzel story before you buy. Heltzel engineers will be happy to work with you in developing just the plant you need for your operations.

The Heltzel Steel Form and Iron Co., Warren, Ohio

Another New Heltzel Flow Plane Installation

169,000 Sq. Ft. of Precast 'Incor' Concrete Wall Panels in New Grumman Aircraft Plant

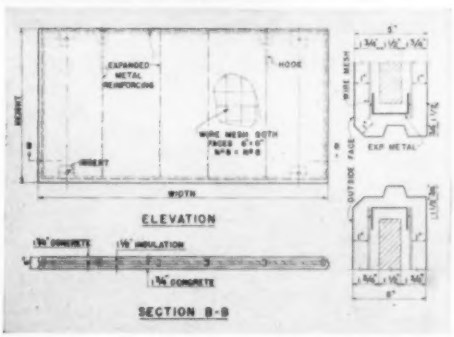
● A sixth Grumman Aircraft plant is being built on a 4700-acre site, on eastern Long Island. The accent is on speed with economy, through the use of 169,000 sq. ft. of precast insulated wall panels, in a complete wall system which is fire-safe, durable, weather-resistant—2500 sq. ft. erected per 7-hour day, with one crane and crew—6 sq. ft. a minute!

Cost is less than usual masonry construction. Size and texture of units give architectural effect and appearance considered by many as superior to high quality cut-stone. Highly-mechanized casting operation gets utmost production speed by using 'INCOR'* 24-HOUR CEMENT. Panels are lifted 18 to 24 hours after casting, placed in curing room for 2 days, then stored in yard. Dependable 'Incor' high early strength assures clock-like schedules.

Another demonstration of assembly-line methods applied to construction—a potential of great significance in the light of today's building costs.

*Reg. U.S. Pat. Off.

Size, texture and quality of panels produces appearance considered by many as superior to high-quality cut-stone—cost is less than usual masonry construction. Above, wall of main building; left, power plant. Panel detail below.



GRUMMAN AIRCRAFT ENGINEERING CORPORATION
Peconic River Plant, Calverton, L.I.
Supervision: **DEPT. OF THE NAVY; BUREAU OF YARDS AND DOCKS**
Architects-Engineers:
OFFICE OF ALFRED EASTON POOR • SEELYE, STEVENSON, VALUE & KNECHT
General Contractors:
GROVE-SHEPHERD-WILSON & KRUGE, INC. • HENDRICKSON BROS., INC.
Precast Concrete Wall Panels:
PRECAST BUILDING SECTIONS, INC.; New Hyde Park, L.I.
in association with: **MARIETTA CONCRETE CORPORATION,** Marietta, Ohio

LONE STAR PORTLAND CEMENT
'INCOR' HIGH EARLY STRENGTH PORTLAND CEMENT
LONE STAR Air Entraining PORTLAND CEMENT
LONE STAR Masonry CEMENT

LONE STAR CEMENTS COVER THE ENTIRE CONSTRUCTION FIELD

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 129,000,000 SACKS ANNUAL CAPACITY

Build 80 concrete masonry houses in Omaha, Nebr., in one project, using half-height block. Three-bedroom homes sell for less than $11,000; insurance company takes all mortgages

By TIP BROWN

Attractive three-bedroom house of concrete masonry has 1000 sq. ft. of space and a carport

Low-Cost Mass Production of Concrete Houses

THE GREAT POPULARITY and excellence of design and construction of concrete masonry houses in Florida, California, Arizona, and other areas of similar climatic conditions are arousing concrete masonry producers in other parts of the country to the importance of making a bid for a larger share of the house building market in their communities.

The concrete masonry house is constantly being beautified by better use of masonry units in exterior patterns and combinations with other building materials. The newly discovered charm of concrete masonry fireplaces and exposed interior walls permits the use of a wide range of colors to match the most ambitious decorative ideas.

Mr. John Q. Public likes to see what he is buying, and so it is that many sales-minded masonry producers are using exhibition homes to demonstrate the virtues of structural stability, good looks, and selling prices that represent economy at the start and freedom from a heavy drain in the future for upkeep. They invite public inspection of the construction from its inception to the day when the completed job is making its bow for public acceptance.

Use Half-Height Block

A development in Omaha, Nebr., west of Elmwood Park, is attracting widespread attention among masonry producers in the midwest and frequent delegations are dropping into town to get first hand information. More than 80 houses occupy two sides of three streets and present an eye-filling sight of differing designs of cheerful-looking, painted exteriors of half-height concrete blocks, 4 x 8 x 16 in., and asphalt shingle roofs of live colors. Streets are of concrete as are curbs and gutters, sidewalks and driveways. Having been recently built, landscaping has not yet been completed. The houses are on 62- x 106-ft. lots and have no basements. A carport with a 60-sq. ft. insulated store room in the rear is provided. Each house has three bedrooms and has slightly over 1000 sq. ft. of floor space. The room arrangment is well adapted to modern living with no waste space. Inside walls are furred and covered with ½-in. sheet rock with a foil backing. Oil base paints were applied to both exteriors and interiors and colors were selected by the new owners.

Interesting details include: graded and seeded lawns, copper plumbing, double kitchen sinks, formica top kitchen cabinets, connections for automatic washing machines and dryers, breakfast nooks in the kitchens, full insulation, bath room fixtures with ceramic tile and showers over bath tubs, mahogany slab doors, oil-fired furnace with perimeter heating through ducts in the concrete floors on grade. Also included are Rusco windows of self-storing screens and storm sash and numerous electrical outlets. The floors are exposed concrete, 4-in. thick, with a brown mineral pigment coloring trowelled in during finishing to give a warm brown color. Waterproof paper covered with sand was used for curing and left in place until all interior work was completed.

Preparing foundations and arranging for plumbing and heating. Note in background how trenches are made for heating ducts in concrete floors at grade

Showing concrete masonry houses in various stages of construction

Low Cost-Mass Production

The contractor, the Phoenix Development Co., Phoenix, Ariz., with Don Decker in charge of building operations, brought to the development the experiences gained from building more than 300 concrete masonry houses in his home area. The Omaha location was selected by reason of the availability of excellent concrete block, good working relations of the building crafts, and a ready market for this type of house. The masonry work was subcontracted to local contractors, Verle Hagan, Carl Kehm, and Wayne Gorton. Ideal Cement Stone Co., Omaha, furnished the block.

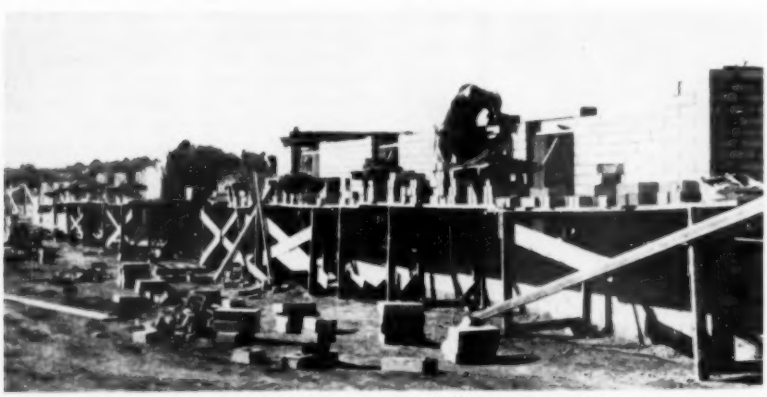
A selling campaign of 60 houses directed by the Len Bourke Realty Co., is said to have been the most sensational success in Omaha real estate history. Following F.H.A. approval and inspections, the New York Life Insurance Co., bought all of the loans which were financed through the City Mortgage Co., of Omaha. One of the houses was opened last July as an exhibition home. Two advertisements urging people to visit the house brought such an outpouring that the 60 houses were sold in eight days. The sale prices were from $10,195 to $10,495 with down payments of $1,545 to $1,695 plus $100 for prepaid insurance. Monthly payments, including taxes and insurances, were approximately $71. The sales price also included the lot, the loan cost, and the street paving. New owners were largely from professional groups and white collared workers of good incomes.

Leaders in the concrete masonry field are devoting much time and study to broadening the market, keeping in mind that now is the time to get activities under way. The adverse position of the industry in the home building field stems back to custom and well-organized promotional campaigns of long standing which favor other types of construction. The tremendous market possibilities offer a great challenge to an industry that has something to sell and waits only upon wide-spread concentration of energy in the selling field.

Suffice it to say, that if every manufacturer engaged in a concrete masonry house project in his home precinct, and followed it with tested methods for conducting public exhibitions, the market expansion would be phenominal. Where local concrete masonry associations exist, the combined efforts of a group who adopt a pattern similar to the Omaha development can be most effective in swinging sentiment to the concrete masonry field.

Adjustments to the increased costs of modern publicity methods for gaining public acceptance may prove shocking to owners who have been accustomed to a very minimum of sales expense. None can be so sanguine as to anticipate such a non-selling situation will be permanent in a country of such great production facilities.

In a period when controls are being removed and inflation fears are waning, prudence dictates an immediate inventory of selling talent on the pay roll and a rapid shift to enlarging the market.



Houses are constructed with concrete masonry half-height units (4- x 8- x 16-in.)

"Quality Concrete"

THE CONCRETE ASSOCIATION OF INDIA recently announced publication of a 218-page book, entitled "Quality Concrete," which was written as a guide to engineers. The book, which is divided into six chapters, discusses in logical sequence the various factors to be considered in the attainment of quality concrete.

Chapter I, on cement, reviews the history, manufacture, chemistry, characteristics and types of portland cement, and also high-alumina, pozzolanic and sand cements. Also described are the methods employed in testing cement and information on storage and batching of cement and on methods of packaging, shipping and handling to and on the job.

Chapter II deals with aggregates —types, characteristics, qualities, contaminating substances and their effects on concrete, and abnormal expansion and cracking of concrete which may result from reaction between small amounts of opaline silica in aggregates and certain constituents of the cement. Grading, classification, geological characteristics, production, storage and handling, and methods of testing, are also discussed.

Chapter III discusses the basic function of water in concrete, disadvantages of excess water, and the importance of limiting the amount of water to the minimum quantity consistent with proper placing and finishing.

Chapter IV is devoted to "admixtures," their purpose and the modifications of the properties of concrete that may be secured by their use. Various types are described and their effects in concrete pointed out.

Chapter V, on proportioning concrete, deals with methods of proportioning, the fundamentals of mix design including the influence of aggregate characteristics. A mix design procedure based on the water-cement ratio is described, together with examples of its application and a chart for calculating quantities of materials for a cu. yd. of concrete.

Chapter VI is devoted to field control of concrete. Control tests, measurement of materials, mixing concrete, field-plant layouts, transporting, placing and finishing are all discussed with emphasis on proper procedures.

Ready-Mix Plant

CONSTRUCTION SERVICE CO., INC., Great Bend, Kan., was recently incorporated by Vic E. Baum, Mrs. June Baum and B. L. Bissell, Great Bend, with a capitalization of $150,000. In addition to other construction services, the company produces approximately 400 cu. yd. of ready-mixed concrete per day. Plant equipment includes storage facilities for 12,800 sacks of cement, 55 cu. yd. of fine aggregate, 55 cu. yd. of gravel aggregate, and 640 tons of crushed stone.

Specialize In

Precast Window Frames

Livesay Window Co., Miami, Fla., also manufactures frames for air conditioners, arches, beams, posts and benches

By PORTER V. TAYLOR

LIVESAY WINDOW CO., Miami, Fla., is recognized as a pioneer in the field of precast window frames. This product has found a ready market in south Florida since most construction in that area is of the concrete block-stucco type. For this kind of structure, a window frame that is made to exact specifications in precast reinforced concrete has many advantages. It makes the installation of windows simple and fast. Once installed, the frame becomes a permanent part of the structure with no chance of rotting, sagging or warping. The company has had a steady market for its window frames for over 12 years and little effort has been spent on advertising or on sales promotion. At present, the company is selling over 200 frames a day, and 150 employes work full time producing them. Occasionally it is necessary to put on extra shifts to keep up with the orders.

Livesay is producing precast frames for room air conditioners which are being used in many Florida concrete block-stucco structures. Even if an air conditioner is not installed when the building is put up, these frames make installation a simple matter at a latter date. The frames are built into the walls and plastered over. An air conditioner can later be inserted simply by cutting through the plaster and finishing off the hole. The frames are also being installed in existing buildings since they can be custom-built for nearly every make of air conditioner. Sales are running over forty a day.

The company does its own shop work and designs forms for the new products. Forms are constructed for rapid assembly and disassembly. It takes less than three hours to set up a form, place the concrete, give ample time for initial hardening in the steam room, and remove the frame from the form. A concrete mixer is on the second floor level and forms are filled from it by gravity through hoses which carry the concrete to the ground level. A vibrator on the mixer is used to speed the flow of concrete. Steam rooms 20 x 20 x 14 ft. are used for curing. Steam is admitted through overhead pipes. The frames are left in the steam room about two hours and are then transferred to outdoor lots for air curing.

Livesay Window Co. has sold both home builders and contractors in south Florida on the advantages of precast frames and other specialties. Nearly all construction plans for concrete block-stucco buildings in the area call for precast window frames and other precast items. Durability is checked bi-weekly by an independent

(Continued on page 273)

Cement silo and aggregate storage bins at Livesay Window Co.

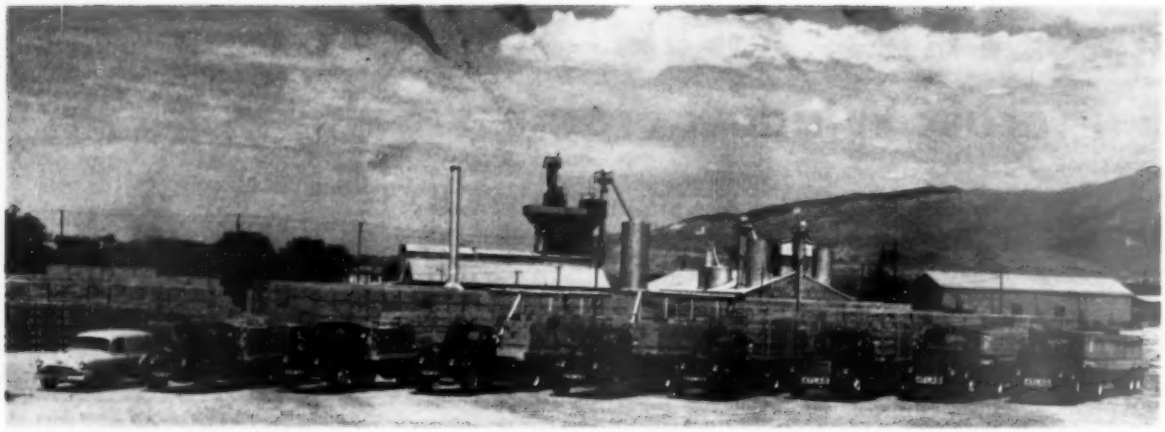
Precast concrete frames installed in a new house; frame for air conditioning unit is at lower left

These three-sided frames are for corner windows

Molds used for casting fence posts with a stack of finished posts in the background

Bus stop benches in Miami are made of concrete end pieces and either wood or concrete seats

Workmen erecting concrete fence posts; corner post is being braced and bolted in place



Part of the company's fleet of delivery trucks, some of which are equipped with unloaders. In the background, to the right, is the Sakrete plant, and to the left is the block plant

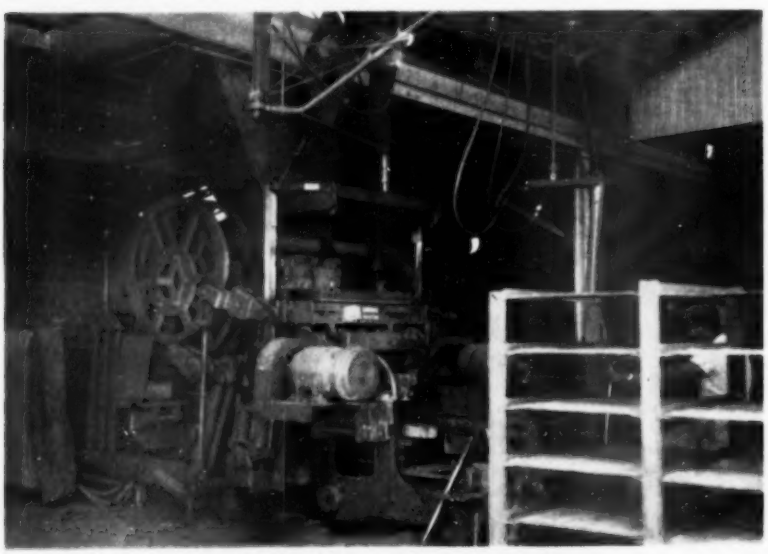
EXPAND MARKET With New Products

Atlas Building Products Co., El Paso, Texas supplies big volume of concrete block for military installations. Also produce reinforced concrete beams, slabs, and dry-mixed concrete

By WALTER B. LENHART

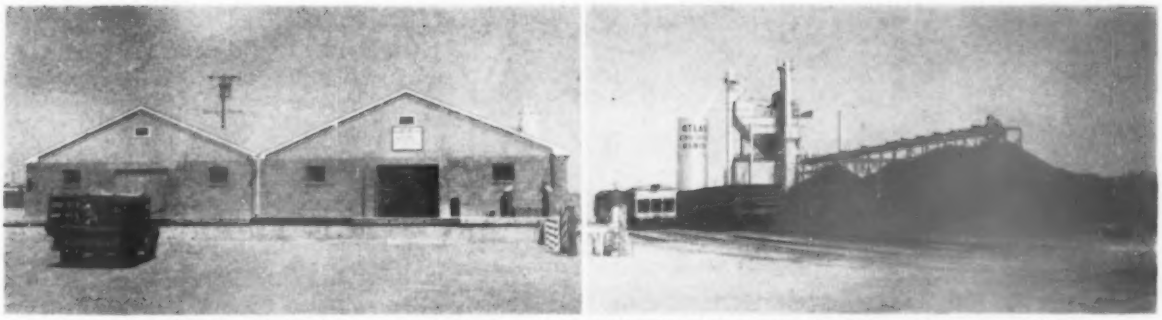
DURING April of 1947, the Atlas Lime Co., as it was then called, was visited by the writer. The company had just entered the concrete masonry manufacturing field with a small plant at San Juan out at the edge of El Paso, Texas. It was a new venture to the lime company. The plant was more or less out in the open. No frills were entertained for it was a new and untried field and therefore caution was practiced. At that time the development that lured us to the plant was the system of unloading block. It is still in use, but has never been exploited by the company, although after our description of the method was published in the March, 1948, (p. 146) issue of ROCK PRODUCTS, the company was swamped with requests for blue prints of the equipment.

The company has experienced a remarkable growth in the six-year intervening period. The concrete masonry phase of the Atlas Lime Co. operations was renamed the Atlas Building Products Co. Tonnage and dollar-wise the lime business became comparatively of secondary importance. The Atlas Building Products Co. now has four Besser Vibrapacs under the same roof. The recent Besser addition went on the production line during March of this year. It was obtained on a lease contract; the older three units are owned outright by the company. The plant is operating on a two-shift basis. The second Besser was installed in 1948 and the third in 1949. All the units are now under cover. A neat superintendent's office has been built at one end of the block manufacturing room with a large window area so that the supervising staff can see most of the operations from the office. Kilns have been added as needed. The yard has been paved. Warehouse space has been provided and, more recently, a Sakrete department and a Stresterete plant have been added to the assembly. From a panoramic viewpoint, the plant and surroundings are ideal, and neatness and order are stressed. The new office of the company could be used as an illustration of neatness and excellent architectural design practices by the staff, using company-made products throughout.



One of the four block machines with mixer above

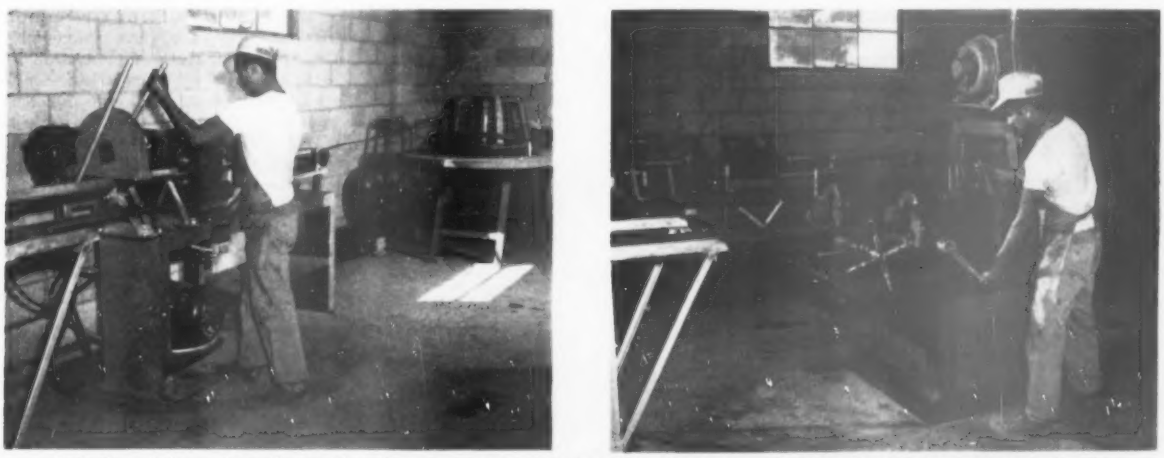
The growth of the Atlas Building Products Co. did not just happen. It was a result of aggressive salesmanship tied to a high quality product, and over the year this pattern has been so carefully followed that it is quite common for specifications that are written for federally-sponsored organizations in the area to state in the specifications, " . . . Atlas concrete blocks, or equivalents . . . "



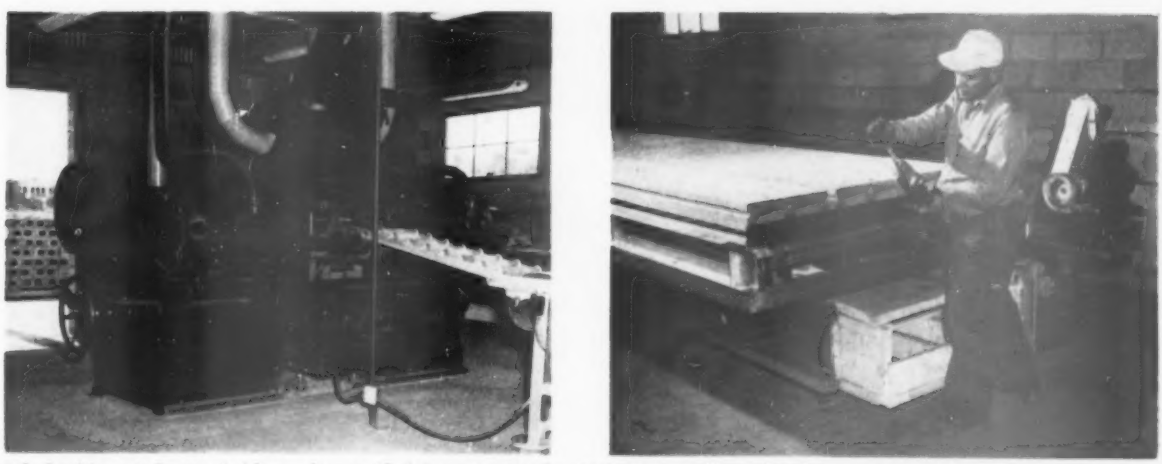
To the left: Building housing the dry-mix concrete operations. To the right: Plant with storage pile of scoria aggregate, on the right

El Paso is not a large city, nor is it surrounded by many smaller towns. It is a railroad and aviation center of importance. Trade with old Mexico, cattle, mining, and smelting, and tourists have helped make it a metropolitan city of importance. A large percentage of the city's population is of Mexican extraction. Possibly the greatest single factor in the city's importance stems from the military establishments surrounding El Paso. They sprawl out over the desert areas of Southwest Texas and New Mexico, and include the White Sands Proving Grounds, Oro Grande North and South Ranges, McGregor North and South Ranges, Alamagordo Range, Hueco Range, Castner Range, Dona Ana Range, etc. They involve guided missile launching sites, artillery ranges, anti-aircraft practicing areas as well as small arms ranges. Biggs Air Force base is also nearby. The heart of this military empire is Ft. Bliss, adjacent to El Paso. Ft. Bliss, area-wise, is probably the largest military establishment in the United States and is a large school for training our soldiers for modern warfare.

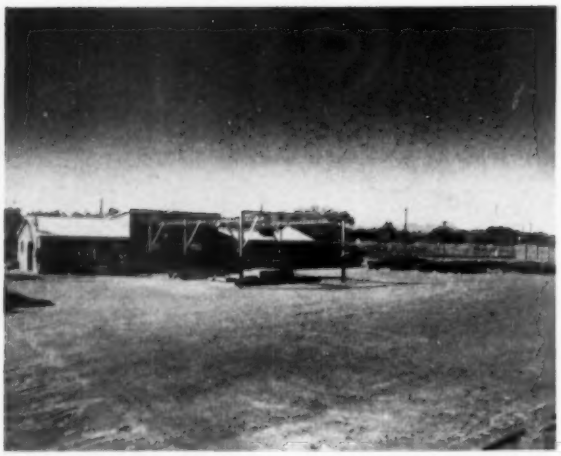
The Atlas Building Products Co. just completed delivering over a million concrete masonry units to Ft. Bliss for 31 permanent troop-housing structures and their supporting facilities. They are all three-story buildings, almost identical as to design, but varying slightly in the number of permanent troops that a unit can handle. The range is from 105 to 225 men each. Each structure is a self-contained unit with its mess hall, day

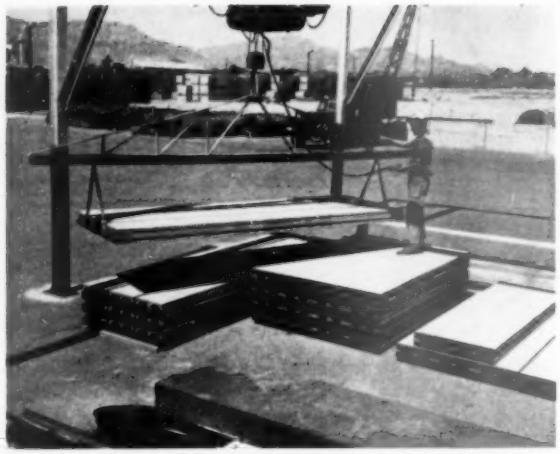


Left: One of the machines for straightening and processing coiled steel for Strestcrete work. Right: Cutting the steel rods to length



Left: Precision grinder to grind faces of scoria block in preparation for Strestcrete assembly. Right: Placing a beam of block under tension with a torque wrench as one step in the manufacture of Strestcrete. The table can be tilted





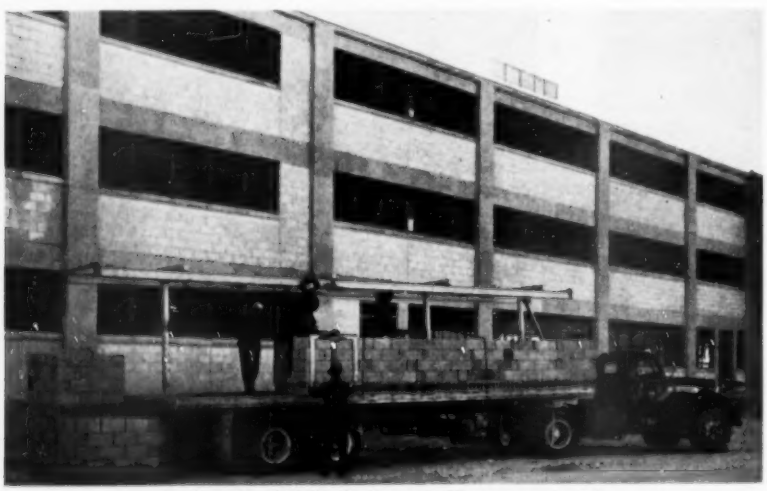
Left: General view of the Strestcrete plant. To the right are coils of reinforcing steel to be straightened and cut to length in the plant. Right: Handling Strestcrete floor slabs with a yard crane

room for class lectures, and sleeping quarters. Each has its central heating plant, and over a half million concrete brick were used for the chimneys alone.

Reinforced Concrete Units

Block are made with scoria or volcanic clinker aggregate that is crushed and screened to minus ½-in. at the company's pit some 55 miles north of El Paso. It is a black-colored material that results in a lightweight block that weighs 28 lb. for a standard 8- x 8- x 16-in. unit, and the manufacturer points out that practically no expansion is experienced.

An important outlet for concrete block at this operation is their use to make Strestcrete beams, slabs and similar units. Block for Strestcrete are handled and stored on pallets. A fleet of Towmotors delivers the pallets to the Strestcrete plant where the block are precision-ground on a Gardner grinder provided with adequate dust collection equipment. Ground block are then conveyed on a short horizontal belt conveyor to a point where the beams are assembled on a tilting deck. Steel rod, purchased in carload lots, is shipped to the plant in coils. The rods are straightened, cut to exact lengths and threaded on precision machines which are all housed in the same neat structure with the grinding unit. Finished Strestcrete units are handled by an overhead crane. The illustrations show steps in the operation. At the time of inspection special Strestcrete foundation structures for oil wells were being fabricated.



Truck equipped with unloader at Ft. Bliss construction job

Scoria pit and plant is 55 miles north of El Paso, Texas

Dry Mixed Concrete

A second important phase of the company's operation is the preparation and sacking of Sakrete. This item finds a wide acceptance in New Mexico particularly with the larger mining companies. Atlas Stucco and Atlas portland cement paint are other important items manufactured at the El Paso (San Juan) plant.

The company has a fleet of 13 trucks to make deliveries. Two are diesel Autocars, two are G.M.C. diesels and the rest are Internationals. Three of the trucks, equipped with the company's unloaders, are used mostly on the shorter hauls, but 240-mile hauls are common and occasionally a 300-mile haul is made. On the longer hauls no unloader is carried as the payload is more important. Long-haul trucks handle up to 1200 standard 8- x 8- x 16-in. units per load.

Merchandising Methods

Merchandising of the numerous products is through about 175 dealers. The company has four sales engi-

Attractive company office building. In the interior are pictorial displays of the various ways in which concrete products made by the company can be effectively used. The structure itself also serves to demonstrate the products manufactured

neers who concentrate on contractors and dealers. These men are under the guidance of Ervin Hahn, sales manager, who formerly was in charge of foreign sales for the Besser Manufacturing Co. Some newspaper space is purchased, but no set pattern is followed. However, the company does have a regular weekly scheduled 30-min. radio program from 7:30 to 8:00 p.m. Sundays. During this program over KEPO in El Paso, semi-classical music is played and a 3-min. "commercial" is interjected. The 3-min. commercial is built around some theme of general historical interest to those living in the area. Ft. Bliss with its more than a century of military life in the land of the Conquistadores, the Confederate flag flying briefly over its walls, and the reflection of hostile Indians in a forbidding desert all add up to a wealth of material for the radio programs. The script for a typical broadcast covers about 2½ typed (double-spaced) pages. The name of the Atlas Building Products Co. is mentioned only once in a brief three- or four-line sentence.

Harry M. Frank is president and general manager of the Atlas Building Products Co. Milton Stovall is vice-president, and Marshall Grant is block-plant superintendent. Fred Schuller is superintendent of the Stresterete division.

Concrete Slab Construction

A NEW TECHNIQUE in precast concrete construction is being employed by the joint contracting firms of Twaits-Morrison-Knudsen-Macco on a Marine Corps artillery project at Twenty-Nine Palms, Calif. Construction is of the precast concrete "tilt-up" type with concrete slab roofs. The project calls for approximately 5000 slabs. For stripping the forms and transporting the 1½- to 4-ton slabs, the Conveyco Monster, shown in the illustration, was designed and built by The Conveyor Co., Los Angeles, Calif. A Hyster No. CP 116 straddle truck was widened 5½ ft. to give a 15-ft. inside width, and the road clearance was increased from 6½ to 12 ft., enabling the "Monster" to stack the roof slabs seven high for curing, with 2 x 4's between each slab. To operate the two 3-ton electric hoists installed on the machine, a 10 kv.a. power generator was added. Hydraulic power steering was also employed.

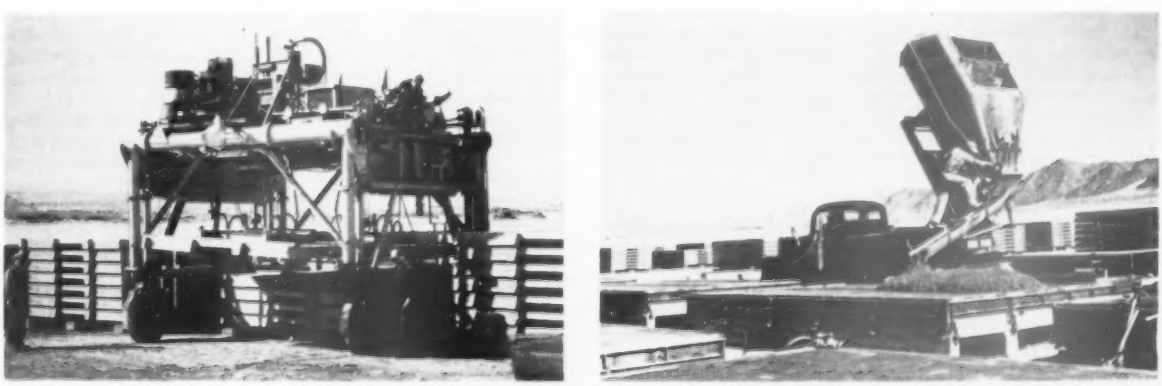
The stripping and stockpiling process reportedly has been reduced to an 8- to 10-min. cycle. One-inch strips of special rubber around the bottom edge of two gripping pads permit a suction grip to the slab of approximately 10 lb. p.s.i., when under vacuum. The two pad units have an aggregate gripping power of about 10,000 lb. Only one slab can be carried at a time.

Before pouring the slabs, the forms are sprayed with antibond compound to reduce cohesion of the concrete to the steel forms. An air-vibrated screed is used to assure uniform compaction. The slabs are subjected to live steam curing for approximately 12 hrs., and stripped on an 18- to 20-hr. schedule. The speed of the machine is claimed to have greatly reduced handling costs. The accompanying illustrations were supplied by Morrison-Knudsen.

Seeks Concrete Code Revision

THE CONCRETE INDUSTRY BOARD, New York, N.Y., which is composed of ready-mixed concrete producers, aggregate suppliers, cement manufacturers, architects, engineers, contractors, testing laboratory officials, city officials, equipment manufacturers, admixture manufacturers, and others involved in concrete work, has appointed a C.I.B. code committee to draw up recommendations for code revisions in concrete construction and present them to the city council. The industry group feels that the city building code is holding back the use of economical concrete construction in New York by not giving proper recognition to many of the modern concrete developments of the past 25 to 30 years, including water-cement ratio; controled concrete; vacuum processing; high early-strength cements; air-entrainment; grading of aggregate; sulphite-resistant cement; use of admixtures; high-bond bars; precast concrete sections; prestressed concrete; and modern material handling techniques.

MONTICELLO READY-MIX CO. has been established at Monticello, Ill., by Dane Smith, Monticello, and Morris D. and Marilyn Hunter, Ogden, Ill. Plant equipment includes three transit-mixer trucks. Mr. Smith is plant manager.



Left: Three-ton electric hoists lift slabs into carrying position; note the vacuum grips at both ends. Right: Pouring of forms entails the use of an electric vibrator and screed to assure a uniform slab

11. A producer views the ready-mixed concrete business . . . .

SALES POLICY

By JAS. A. NICHOLSON*

IN OUR INDUSTRY, the combination of a fair price, consistent quality and A-1 service is hard to beat. Such a combination provides a ready-mixed concrete operator with a sound sales policy.

You carefully develop a workable sales policy by meeting the requirements of the market, catering to the needs of the customer and equalizing or overcoming the efforts of your competitors.

You study the requirements of the market to determine:

1. Whether to service the whole market or only part of it?

Available facilities and length of haul are deciding factors. In determinging your market of operations, you should decide within what radius or area of your plant or plants you will actively solicit business and how far you will actually agree to deliver orders. In a small urban community you should work out a delivery area so that you can average seven to nine trips per day with the transit mixing equipment. In large metropolitan cities, traffic conditions will restrict zones of operation. Business should be solicited within areas that will enable you to make with each unit, a minimum of five to seven deliveries per day.

2. Whether the market is industrial, residential, or farming?

If your market is principally industrial you will have to figure on a big volume of business handled at low profit margin. Industrial contractors demand bottom price and top service. To handle this kind of trade, ample heavy (probably tandem) delivery equipment should be available. You have to be able to deliver big pay loads in rapid succession. The selling price has to be fairly competitive with job set-up costs.

If your market is principally residential, you will get fewer deliveries per day with your units. Job requirements are reduced; slow unloading practices will be the rule. You must get a bigger profit margin. Smaller delivery equipment can be efficiently used, and it is necessary to watch credit risks. When your service accommodations are limited, you should stay away from paving work and all big jobs. Take care of your regular trade. With residential contractors, stress service and convenience.

When operating in a farming market, many small orders, slow unloading practices and deferred payments may be expected. Smaller transit mixers can be used effectively. Your financing program and sales terms should be based on the assumption that many accounts will not be paid in full until the crops are harvested. With farm trade, stress convenience and availability.

Investigate the needs of your customers to determine:

1. Whether to carry other lines of building material?

In some markets, concrete sales are tied to other materials in short supply. The sale of such materials might be required to lead a sufficient percentage of contractor customers to do business with you on concrete. Again the market may be so limited that other lines must be carried to insure a profitable operation.

2. What equipment to buy?

Equipment (plant and delivery) should be geared to the needs of the customer. Equipment and personnel must be adequate to give him efficient service.

3. What pricing policy will best guarantee a profitable operation?

You have to decide whether to go all out for volume or restrict sales to deliveries which show bigger profit margins. Always remember that you are not primarily interested in sales volume, but in how many sales dollars will be left at the year end in solid net profit.

4. What discount and credit policies will best fit the situation?

The customer will expect substantially what he gets from other suppliers. It might be to your advantage to better such policies. If your financing position is an important factor, you might want to increase the discount and reduce the credit duration. It might be wise to restrict both. Consider the needs of the customer; but don't over-reach on your capacity to cooperate.

Evaluate the efforts of your competitor to determine:

1. What is his reputation among the different types of customers?

It never pays to under-estimate a competitor. Analyze his position thoroughly. Where is he solid? What are his weaknesses? In each customer classification, look for contractors who think that the competitor has given preferred treatment to other contractors in their field. Commit yourself to a service program that offers the prospective customer hopes of improved service. Then live up to your commitments.

2. Whether to go after the whole market or only part of it?

Your decision may hinge upon a competitor's strength. If he is tough, it generally pays to stay out of his own back yard and away from his favorite customers. If his financial position is substantially better than yours, it is wise to avoid sales that might lead to a price war or a cat-and-dog fight. Under such conditions, go after the kind of trade the competitor has not been effectively handling and in which he is not too much interested. If competition is weak, take the cream!

3. Can you adopt methods to place yourself in a better competitive position?

A competitor may be geared to a straight axle truck operation. Customers may be experiencing difficulty in getting his trucks into jobs. A substantial investment in tandem equipment coupled with on-time deliveries may throw the balance in your favor. The setting up of efficient plant controls can be similarly used. *Hit him where he is soft.* If he has made a practice of being tough on waiting time charges with a large segment of his customers, the vital weakness may be on that point.

4. Can you compete favorably on operating costs, service, selling price and profits?

If his costs are lower, you must have a higher average selling price to enjoy a profitable operation. If his service is superior, it pays to stay away from the business he actually solicits. If a job's requirements are more than you can properly service, it is poor competitive practice for you to throw in a lower bid. If a competitor is undoubtedly favored on certain work, there is no sense going in with a low bid just to upset the applecart.

5. How to beat your competitor to the business?

Remember that your good customers are well known to your competitors. They would undoubtedly like to get such customers' business. Aggressive competition is met by featuring on-time deliveries of quality concrete, reasonable quotations, proper selling practices and courteous, sensible credit arrangements. Make good customer relations your prime consideration. The operator who beats his competitor to the punch is the one who overlooks no bets. He gets sales leads from friends, the banker, insurance agent, equipment supplier and social organi-

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zations. He closely follows building reports (e.g. Dodge) and building permits. He is in close touch with real estate offices (here is where construction starts) excavating contractors, architects, and the city hall. He gets help from cement, aggregate and equipment suppliers in beating his competitor to new business. Such help takes many forms. A supplier might be able to use an important contact, line up required equipment in a hurry, or give a better price on a big project. Reciprocity in business, properly timed, might be helpful. Arranging a lease for adjacent property or tieing up a source of aggregates has swung many a big job. Certainly, a ready-mixed concrete operator who enjoys the solid support of strong suppliers is in a fortunate position.

Contractors, who give you substantial off-season business, should have no trouble at any time with either service or shortages. In case of cement shortages or unexpected failure in your aggregate supply, save what you have available for your regular contractor customers—they are your bread-and-butter accounts. Give such customers first consideration in the busy months. Ready-mixed concrete orders cannot be handled on a first come-first served policy. Preferential procedures should be carefully worked out and should be based on facts.

Some operators in cement shortage areas have prevailed on customers to use accelerators, fly ash, dispersing agents or other admixtures designed to cut down on the amount of cement required per cubic yard. Sensible efforts to stretch out your supply of cement should be made. However, you should be certain that the substitute material fully compensates for the cement reduction. This is never an occasion for dishonest practices. Never make a wrongful cutback on cement. Cement savings procedures should be based on sound grounds:

1. The customer has accepted the substitute material.
2. The concrete meets job requirements.
3. The contractor is honestly billed.

In peak building months, the average ready-mixed concrete operator is overloaded with business. Under such circumstances, he will be called upon to decide whether to give certain promising contractors the little extra breaks they need at that time. Provide this extra help up to the point of harming more established customers. Do so by restricting sales to private individuals or to sporadic contractor customers, and by eliminating part-load deliveries (other than clean-up) to all except preferred contractors.

At such times a companion question must also be decided—whether to take on new customers? Under such circumstances, never try to take a customer away from a competitor. However, if you feel a new contractor will develop into a promising account, it is good business to work him into the picture even if things are very tight.

On peak days and in shortages, your judgment had better be good!

Pricing Policy

In 1929 Alex. Foster Jr. of the Warner Co., advised the then new ready-mixed concrete industry that the average selling price for concrete should be based on twice the profit return for cement and aggregates as compared with regular deliveries of those materials to construction work. This necessity for added gross and net margin was undoubtedly due to increased costs in processing a product to be delivered in special purpose expensive equipment on a close time schedule.

Mr. Foster's 1929 advice is good pricing policy today.

To succeed, the ready-mixed concrete operator must profitably price the concrete he sells.

The customers of a ready-mixed concrete company are made up of private individuals or small concerns using concrete in their own work; contractors doing driveway, housework or commercial construction; and large contractors handling industrial or

A Splendid Opportunity to Improve Your Business and Product

• THIS SERIES OF ARTICLES by James A. Nicholson on the subject of ready-mixed concrete has generated unprecedented interest among producers throughout the industry. The author and the editors are receiving many complimentary letters on the quality and practical value of the articles. Some of these letters raise questions which indicate a desire for interchange of ideas on many aspects of the industry.

The ready-mixed concrete industry is growing rapidly and there are many relatively new companies in this business. That fact plus the need for practical information also by well-established concerns, as evidenced by letters received, has prompted us to set up a question and answer procedure as a service so that all producers may have an opportunity to benefit from the experiences of others.

We have asked a selected list of qualified producers to help us out by serving on our "panel of experts." It was gratifying to receive favorable replies from nearly all who were invited to participate. None of them wanted to be classed as an "expert" but we think that each individual has something of value to offer on one or more phases of the business which is his specialty.

Our panel consists of the following:

Fred F. Bartel, Tews Lime and Cement Co., Milwaukee, Wis.

Edward M. Brickett, Hume Pipe of New England Inc., Swampscott, Mass.

W. J. Hicklin, Jr., Capitol Concrete Co., Jacksonville, Fla.

E. L. Howard, Pacific Coast Aggregates, Inc., San Francisco, Calif.

Herbert G. Jahncke, Jahncke Service, Inc., New Orleans, La.

Walt Keeler, The Walt Keeler Co., Inc., Wichita, Kan.

William Moore, J. P. O'Connell Co., Boston, Mass.

R. P. Mumford, The Beckley and Myers Co., Springfield, Ohio

Robert F. Porter, Harry T. Campbell Sons' Corp., Towson, Md.

J. W. Roberts, Southern Materials Co., Inc., Richmond, Va.

J. L. Shiely, Jr., J. L. Shiely Co., Inc., Saint Paul, Minn.

Walter K. Wagner, Albuquerque Gravel Products Co., Albuquerque, N. Mex.

Jack Winkworth, Winkworth Fuel and Supply Co., Detroit, Mich.

James A. Nicholson, Nicholson Concrete Co., Toledo, Ohio, author of our series of articles, completes the list of 14 men who have expressed a desire to help the industry through an exchange of information. These men represent all parts of the country and among them are specialists in the technology of concrete, plant design, labor relations, customer relations and all other phases of the business which Mr. Nicholson will cover in his series of articles.

Producers are invited to submit their problems and questions to the editor of ROCK PRODUCTS and we, in collaboration with Mr. Nicholson, will refer them to the panel and other authorities for reply. We will publish the question together with the comment in reply, and we will not mention your name if you prefer and so indicate in your letter.

The main point we make is that here is an opportunity to help yourself to improve your business and the quality of your concrete. To refresh your memory and to help guide your questions, Mr. Nicholson's series began with the October, 1952, issue and has been running each month. It will continue for many more months before completion.

Let's have your questions while the Nicholson articles are current. Our panel will be available only until the series is finished.

THE EDITOR

paving and other public projects.

The private individual places orders over the telephone. He may call several concrete suppliers for quotations. It is certainly foolish business when competitors quote different prices to such prospective customers. The individual may be purchasing concrete for the only time in his life. There will surely be inefficient job handling of the concrete. Added unloading time will be required. There is every reason that this classification customer should pay the long price for his concrete.

On such sales there should be a standard market price. It would be dangerous to use a zoning price system. On sizable orders, there might be a temptation to quote price from a closer zone. It is good policy to rule out the possibility of error. On private sales you should have only one price for a given cement content concrete, delivered anywhere in the city or market.

Over the phone sales fall off when competitors telephone prices are lower than yours. When you have reason to question whether telephone prices are being maintained, you should have parties call your competitors for quotations. You should expect that your own quotations are being similarly checked. If you are desirous of getting an even break on telephone sales, whatever price your competitor is quoting, should be your present price to individuals.

As to contractor customers, two common practices on selling prices prevail in our industry:

1. Quotations are based on the size of the job; e.g., for a job under 100 cubic yards, a certain price is quoted. On work involving 100 to 500 cu. yd., a lower price is bid. On big projects, quotations are tailor made to fit the conditions.

2. Contractor sales are broken down into two price classifications. Large industrial and paving contractors are quoted the bottom price. Driveway or commercial contractors and house builders are quoted somewhat higher. Defenders of this practice contend that the efficiency of the larger contractor and the nature of the work justify the difference. Price differentials are based on the probability of more trips per day with the same delivery equipment.

That probability is also used to justify a price system based on a zoning arrangement.

Your own experiences will support both contentions. In zoning, your price is based on the length of haul. In classifying contractors, you recognize and credit prompt unloading practices. When you properly acknowledge the two factors which in combination produce more trips per day, you provide a sound basis for a fair pricing policy.

The best pricing policy is that which yields you the best net profit. If your operation costs are higher than your competitors, it is good practice to specialize on the smaller jobs and on the contractor who is willing to pay a little more for service, which he knows he won't get from ready-mixed concrete companies that are primarily interested in big work. If your operation costs are lower than your competitors', the lower price policy might prove more profitable with the increased volume, further reducing your already lower costs.

Many operators find themselves in the position of catering to the big contractor, with too much concrete being handled at a low profit figure. In order to obtain necessary average markup, many small orders showing high profit margins may be required to balance out the effects of large industrial and paving contracts taken at a low profit margin. It is generally safer procedure to have a balanced operation by soliciting and servicing both large and small jobs.

Your monthly sales should be broken down to determine if you are detrimentally catering too much to a certain customer clasisfication.

It is our experience that the steadiness of the sales is more important than the volume of the particular order. We prefer customers who use one to four trucks every day. On project work, large pours develop which require many trucks and this demand disrupts our service to other customers. On days when sizeable pours are not being made, it is sometimes difficult to fill in with small orders.

Ready-mixed concrete companies are outstandingly successful when they are able to combine higher than average profit margins with lower than average costs of operation.

As a general rule, sales below average required markup should only be considered when assured that the business will develop more trips per day, coupled with lower plant and delivery costs. However, there are times when it might be wise to take a short profit job in order to get a leading contractor to give you an opportunity to prove yourself on service and quality.

Records of our industry show that the habitual price cutter is on shaky ground. We deliver a low priced product in expensive hauling units legally held to small pay loads. We must find an overall profitable market for our sales. The future is not in price cutting but in an intelligent approach to a broader market for our concrete, which might possibly involve the addition of some new lines to our present operations.

Unless your competitors' quotations are out of line, building your future on under-market prices is dangerous practice. It might be better to lose the big job rather than to jeopardize future profits. Undercutting may get you the particular business. However, if undercutting is your chief sales weapon, sooner or later, you will wind up out of business.

As part of an efficient sales policy, you should, whenever possible, eliminate unprofitable sales. Possibly, by securing the cooperation of a customer, hitherto unprofitable deliveries can be changed into profitable sales. The profit is taken out of deliveries to contractors when job operations are not efficiently handled and the builder constantly under-orders or over-demands.

Profits are Necessary

On deliveries that cost you money, the contractor fails to have his equipment, men and job ready when the truck arrives; not enough men are available to handle effectively your equipment; forms are always failing or for many other ever-present reasons, discharge operations are constantly being delayed. When a contractor makes a practice of under-ordering, your expensive delivery equipment is handling too high a percentage of partial loads. In these days of high labor and other operational costs, such cleanup deliveries simply cannot be profitably handled. The contractor generally yells when you even try to charge him only actual costs.

The practices of under-ordering or over-ordering are equally destructive. Delivery schedules are knocked completely out of balance. A contractor orders 20 cu. yd. of concrete and asks for two trucks; then without consulting the operator, decides to pour 50 cu. yd. and proceeds to start such work. In the planned delivery schedule for the day, the two trucks had been set up for other customers at a given hour. On-time deliveries are so important in the development of a profitable operation that this important practice must be effectively controlled.

Remedial steps include the following:

1. Overall problem discussed with the contractor.

2. Contractor told at the time of taking the order that deliveries are expected to be completed on a number of trips so that other deliveries can be made on schedule.

3. Drivers advised to caution the builder that trucks have been promised for other work.

4. Refusal to be obligated for additional deliveries on instructions given to drivers.

5. If the over-demanding practice becomes a nuisance, the ready-mixed concrete man must decide either to shut off the concrete at the end of the scheduled pour or else accept orders from such a contractor only on days or at hours when additional trips will not be harmful to the operation.

The requirement of additional trips to a job on a busy day poses other important problems; that is, later deliveries are not only delayed but are made on overtime pay, thus sharply reducing or even eliminating profits.

Certain contractors, by repeated slow-unloading practices, put a drain on the operator's profit. When an op-

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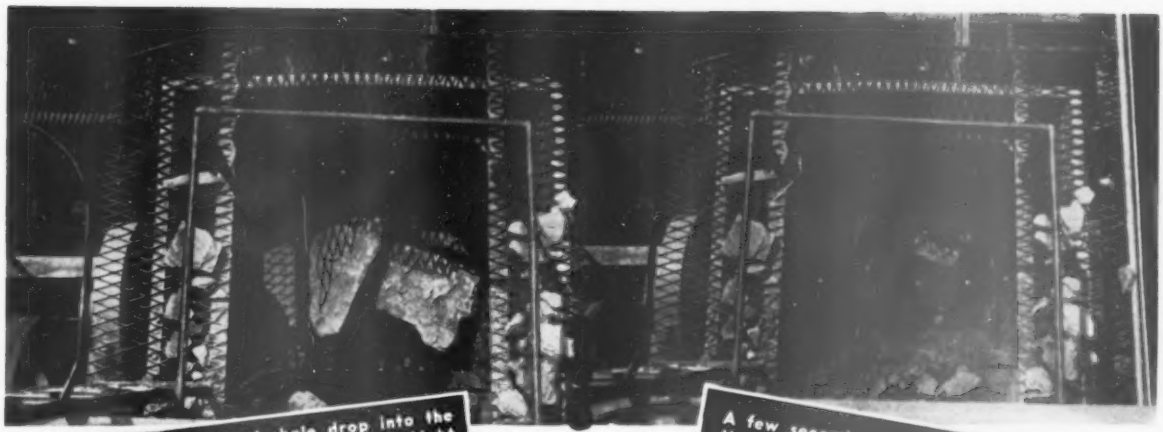


Two large chunks of shale drop into the Eagle shale crusher at Kentucky Light Aggregates, Inc.

A few seconds later and they're through the crusher in small pieces—sizes easy to burn in the kilns.

COST CUTTING EQUIPMENT FOR *Lightweight* AGGREGATE PRODUCERS

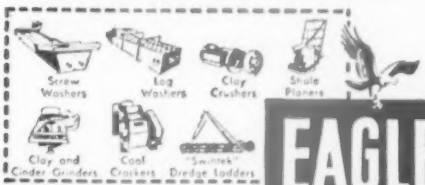
Lightweight aggregate producers all over the country are cutting costs with Eagle Clay Crushers—because they reduce even the toughest shales on a tonnage basis. Exclusive slow turning feed-in roll and opposing fast turning reduction roll—both with spiral hooked teeth—do the trick. Cutter—hammermill—crusher action nothing like it. Up to 100-tons per hour with the Eagle Standard—up to 200-tons per hour with Eagle Senior crusher. Get the facts today—send for Bulletin 952.

EAGLE SCREW WASHERS

Eagle Screw Washer is used by Carolina Tuff-Lite Co., Salisbury, N. C., to wash and classify sintered shale to remove excess fines. Cinder Concrete Products Co., Kansas City, Mo., uses Eagle Washer to give cinders a lime water bath to seal in iron compounds in cinders to prevent "staining" in concrete blocks. The Eagle unit also dehydates the lime coated material.

EAGLE GRINDERS

Eagle Grinders are cutting costs too, at lightweight aggregate plants. No screens to clog. Readily adjustable pan rim discharge—a smooth flow of minus ⅜" mesh aggregate—day after day. Low maintenance and operating costs.



EAGLE IRON WORKS

LEADERS IN AGGREGATE WASHING AND CLASSIFYING EQUIPMENT FOR HALF A CENTURY
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DES MOINES, IOWA

California Block Manufacturers Inspect Arizona Plant

Builders Supply Corp., Phoenix, Ariz., entertains members of the California Concrete Masonry Manufacturers Association

Visitors on a tour of inspection of Builders Supply Corp. plant

THE BUILDERS SUPPLY CORP., Phoenix, Ariz., was host to the California Concrete Masonry Manufacturers Association at Phoenix, June 5-7. Arriving together in a special section of the Southern Pacific Golden State Limited, the 55 members of the association were met at the depot. After interviews by the press and the usual photography, the party was escorted to the Desert Inn Motel, a lavish two-story structure a block long, built entirely of Superlite pumice block, and completely air conditioned.

On Saturday morning the entire party was taken by chartered buses, direct to the main plant of the Builders Supply Corp. for an inspection tour. Here they were able to see one of the largest block plants in America in full operation. (See ROCK PRODUCTS, July, 1953, p. 136).

Starting at the beginning of the manufacturing procedure, the group was shown first the railroad siding which has a capacity of 14 rail cars. The raw pumice and scoria are brought in special Santa Fe cross hopper-bottom cars and spotted over an underground trap receiver into which the materials are dumped by simply opening the trap door under the cars. Conveyors carry the raw material up out of the trap into a primary 16- x 36-in. Blake-type jaw crusher, then by elevators the material is lifted to a 4- x 12-in. Symons double-deck vibrating screen for primary separation. Oversize material is then transferred to two sets of roll crushers, one a MacFarland 16 x 36-in. twin drive roll and the other a 14- x 24-in. Allis-Chalmers roll. The crushing and sizing plant is a closed circuit which finishes the material and then by conveyors, the material is transferred to four large storage bins having a capacity of 12 carloads of crushed material in each bin, or a total storage of 48 cars.

Party of California concrete products manufacturers alongside train at Phoenix station

California producers see unloader in action

The mixed aggregate is dumped into hoppers directly over the six Besser block machines and the Kent lintel machine and feeds by gravity into the machines.

The off bearer for each of the machines fills two racks on each side. The visitors saw how Builders Supply Corp. had welded two standard racks together, end-to-end. They also saw how the beds of the Elwell Parker low-lift platform trucks had been lengthened so as to pick up these two racks at a time—another cost-reducing idea. Another feature for lowering manufacturing costs was demonstrated when they saw some new Yale fork trucks pick up two standard cubes at a time to carry them to the storage yards. Of interest at this point was the fact that in the storage yards at the plant, one could see 4½ million block cubed and stacked waiting for proper aging before delivery.

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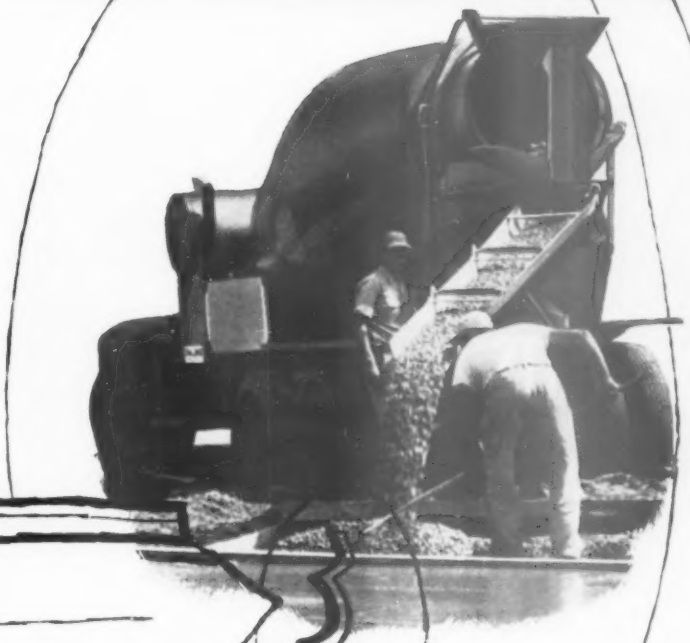
your truck mixer is the key to your READY MIXED CONCRETE operation



The Challenge 5-Yard Mixer will carry 5 yards of concrete on specification jobs and is legal in 39 states carrying 5½ yards of concrete on a tandem drive truck weighing approximately 11,000 pounds. The Challenge 3½-Yard Mixer mounted on a 2-axle truck is legal in all 48 states carrying 3½ yards of concrete.

CHALLENGE is your key to greater profit!

As an experienced operator, you know the less number of trips required to pour a given amount of concrete, the greater your potential profit. That's exactly where Challenge fits into your picture, and why operators everywhere are standardizing on the Challenge "5" as the *backbone* of their fleet, supplementing the big jobs with the Challenge 3½-yard mixer. It's that *extra half yard* of concrete which means less number of trips, and in turn represents MORE dollars of profit per year!

Just for fun, check the first six months of this year and find out, 1. the average number of cubic yards of concrete per job, 2. the number of round trips required per job, and 3. the number of jobs that could have been completed in *one or more* LESS trips if you had been operating Challenge 5-Yard Mixers.

Complete information on Challenge Mixers will be supplied on request.

Cook Bros. Equipment Co.
Please send complete information on Challenge Mixers together with name of my nearest Challenge dealer.

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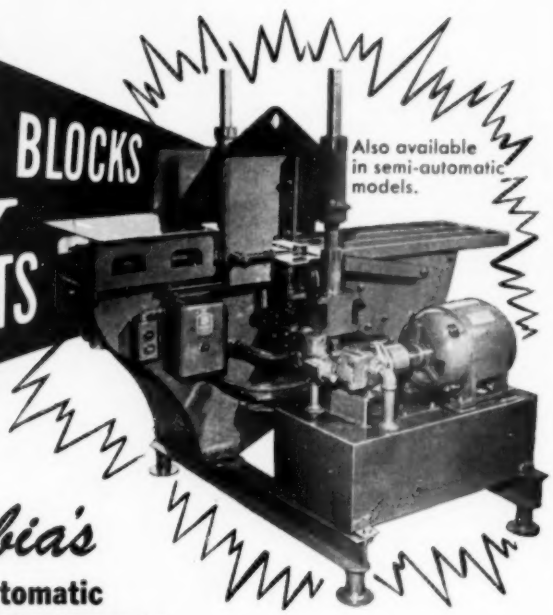
Exclusive National Distributor For CHALLENGE TRUCK MIXERS *Standard of The Industry*

SPLIT BLOCKS BOOST PROFITS



Columbia's Fully Automatic BLOCK SPLITTER

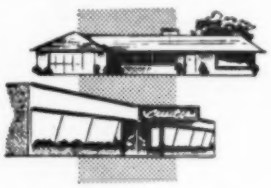
Columbia's fully automatic block splitter provides the producer with a very profitable sideline at a low capital investment. Split blocks, with infinite choice of color and pattern effects, enjoy ready consumer-dealer acceptance. They compete with, or are lower in price than, conventional clay products, yet allow the producer a comfortable profit margin.

Investigate Columbia's block splitter today. Same rugged construction, same high production capacity, so characteristic of the Columbia Line.

SALES, SERVICE and MAINTENANCE throughout the United States with headquarters in Washington, California, Wisconsin, Ohio, Mississippi, Florida, New Jersey, South Carolina and Virginia. Fast service to all parts of the country.

CONTRACTORS SPECIFY *MORE* COLORED CONCRETE UNITS!

...for home and business



Split blocks offer economy as well as a limitless variety of pleasing design and color for facings on commercial store fronts or homes.

Yours FREE! Write for new catalog of the Columbia line.

Columbia MACHINE WORKS

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Rock Products

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Visit Arizona Plant

(Continued from page 268)

Each cube is marked with the shift number and date of manufacture.

One idea the visitors picked up was the way cubes, which are made up of small units, such as sill block, half block, or assorted small block, can be held together in the cubes without falling apart. This is accomplished by placing a sheet of paper between every other row, or layer of block. If the block are stored out of doors, subject to the weather, it is better to use a water-resistant kraft paper.

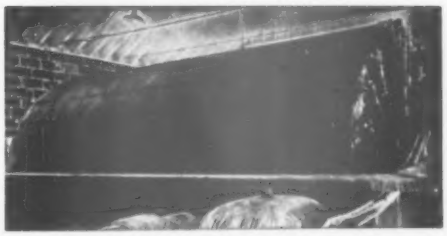
A very interesting session was held in the Builders Supply laboratory at the plant. Under the direction of Dr. George G. Olson, the visitors were shown various experiments and tests being made on various aggregates, binders, admixes, and formulae. Many questions were asked and answered regarding design mixes, shrinking, moisture absorption, etc. After the trip through the laboratory, the visitors had a preview of a new block cubing machine under development at the plant. This new machine has been designed to push the block off the racks automatically after curing and stack them in standard cubes ready for the stockpile. This new automatic cuber will cube all the block six Besser machines can make. The tour continued through the mezzanine floor where they saw the traveling batchers feed seven 50-cu. ft. mixers from one central batching position. The group was conducted through the machine and repair shops where the mold boxes are rebuilt, where the fork trucks and low lifts are overhauled and where the repair parts are kept ample for any emergency.

The new Superlite Unloader was the most outstanding demonstration, according to the comments of the visitors. A fleet of trucks equipped with these unloaders was very impressive, and one truck proved, by demonstration, that 1080 8- x 8- x 16-in. block can be unloaded in 20 min. or less. The Superlite Unloader was designed and perfected by Builders Supply Corp. and is being manufactured by its affiliate, the Builders Equipment Co.

The association group was then taken by chartered buses on a tour of the various housing and building projects in the City of Phoenix, showing them the many beautiful and effective ways block may be used in construction. After visiting several tracts of from 200 to 1500 Superlite block homes, they were also shown many of the larger fine homes in Phoenix built of these block.

The group were finally returned to the Desert Inn about 5:00 p.m. so that they could take a swim in the pool and freshen up for the evening. The entire group, with their wives, were the guests of Builders Supply Corp. at a dinner and cocktail party held at Newtons Prime Rib, one of the finest eating establishments.

LEFT: Discharge of Processed Lime Putty into receiving hopper. Note thickness of lime mat (1½").



ABOVE: Coil springs on filter drum.

FASTER - MORE ECONOMICAL WAY TO MAKE BETTER QUALITY LIME PUTTY

NOW you can produce high-quality Lime Putty in a fraction of the time, with greatly reduced work, less ground space for equipment, and at lower cost. Two men can operate the plant.

This revolutionary new Miller-Komline Process assures uniformity of quality, and produces a cool putty ready for immediate use by plasterer or bricklayer. Lime putty of varying density can be produced according to customer requirements.

Ready-mixed Concrete Producers having surplus truck mixers can readily diversify their business, guaranteeing more continuous use of their equipment through production of ready-mixed brick mortar.

Underside of slaker, vibrating screen, and pump to filter.

A NEW, REVOLUTIONARY PROCESS. DIFFERS FROM PLANTS NOW IN USE IN THE FOLLOWING PRINCIPAL WAYS:

- Eliminates the large, expensive "aging" vats or tanks, along with time for cooling and dewatering the putty.
- Putty produced through this process requires no "aging." The time element is literally reduced from days to minutes.
- The putty is completely conditioned for immediate use by the mason as it leaves the machine.
- Samples of putty taken from any part of the machine are always uniform with respect to coolness and consistency.
- In the case of ready mixed mortar plants, the Miller-Komline Process can be used satisfactorily with either high calcium or dolomitic quicklime.
- Greater capacity per dollar of investment is obtained with this process over other putty plants employing the "aging" tank principle.
- It is very simple to operate. It is low cost.

WRITE FOR INFORMATION ON HOW THIS NEW PROCESS CAN INCREASE YOUR VOLUME AND PROFITS

EXCLUSIVE PATENT LICENSES ISSUED TO QUALIFIED PARTIES

SERVICE ENGINEERING COMPANY

HOWARD B. BISHOP, *President*

SALES ENGINEERS FOR THE MILLER–KOMLINE PROCESS

SUMMIT, NEW JERSEY

COMMENT
from the BUTLER ENGINEER

Leis to Permafrost . . . and Super-Super Markets

You can think of Butler Bin whenever you cross the Hudson River on the new Nyack-Tarrytown Bridge. It will be the big link on the New York Thruway that connects Leon and Eddie's, the Stork Club and the Copa with Mr. and Mrs. America — and others less jelled matrimonially.

The piers for the bridge are poured by a huge dual central Mixing Plant — engineered and built by Butler. The Plant is a towering and busy edifice floating on a scow and it undoubtedly mystifies 99% of the shoreline superintendents. They probably figure it's some sort of secret weapon.

By the way, there's enormous activity in big Ready Mixed Plants this year. I'm busy engineering more Plants with 6 yard mixers than there are already functioning in the entire country.

Remarkable how many different problems we'uns at Butler Bin must study. The prospective 49th and 50th States, for example. I have to jump from leis to permafrost in designing Plants for Hawaii and Alaska.

We've just completed a Paul Bunyan-like Plant for a "super-supermarket" operation to supply all sorts of concrete masonry products, concrete pipe, central mixed concrete—yes, even asphalt. Hollywood couldn't describe the gigantic aggregate handling system. Strictly modern. It conveys from great stock-piles of a wierd variety of materials to the various plant components. Highly complex—but it all hums along smoothly as my wife's sewing machine.

Gotta 6 yard mixer in your attic which you'd like a plant built around?

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Selling Ready Mix

(Continued from page 266)

erator is constantly able to make on-time deliveries, waiting time charges may be fairly imposed. However, no contractor will sit still for such charges when he has been repeatedly forced to accept late shipments of your concrete. Some operators have been able to sell slow-handling contractors into providing job hoppers to permit prompt disposal of the concrete.

Even on slab work which should be fast, some contractors hold up unloading operations by using available manpower to level off and screed concrete. Such customers should be placed in a higher selling price bracket than those who generally promptly unload your trucks.

Here are a number of general suggestions on how you can change your sales policy in order to effect an increase in your profits.

1. Limit concrete deliveries to profitable zones of operation.
2. If your operation costs are high, seek customers who are willing to pay more for their concrete.
3. Accept small (partial load) orders only when they can be profitably handled or circumstances require that you deliver. Caution: Don't completely reject such orders; advise that your facilities are booked far in advance.
4. Put into effect, fair waiting time charges.
5. Make adequate extra charges for overtime and Saturday sales.
6. Eliminate any questionable credit accounts.

A number of operators have found they can substantially improve their profit picture by setting up a central mixing plant. In such an operation, partial load deliveries can be changed into profitable "pick up" sales, approximately 50 percent more concrete can be hauled on each trip when the transit mixer is used as an agitator or revolving carrier and non-agitating delivery units can be effectively used coupled with a sharp decrease in costs.

Whenever possible, new profitable sales should be secured. Just as certainly, old unprofitable sales either must be eliminated or changed into profitable deliveries.

Developing New Markets

Your market is limited only by your thinking.

The introduction of new products (not previously widely used in your local market) or making available special concretes at a reasonable selling price may be used successfully in getting new accounts upon your books. The introduction of a new admixture, on which you have exclusive distribution might be the spearhead for obtaining a considerable amount of fresh business. The advertised use of an automatic dispenser for proper handling of calcium chloride might lead you to many new customers.

We have had recent experience in using high early cement as a lead to new winter business. Until several years ago in Toledo, high early cement was not available in bulk. The bagged material was infrequently handled and high early cement concrete was sold strictly on a penalty premium basis. We provided bulk storage for high early cement. For early strength cement of the same content, we charged a $1.00 per cubic yard more than regular concrete. We offered high-early-strength concrete of the same strength at regular concrete prices. The cement content was necessarily somewhat reduced. In our 1950-51 winter operations, high early cement was used in more than 50 percent of our sales. Total sales for the period were considerably higher than in the previous year.

In some markets either building tile or concrete block are used in the construction of house basements. In such markets the use of ready-mixed concrete in pouring basement walls is not common practice. The story is always the same. Contractors frequently experience water leakage trouble with their present construction methods; they would like to go to poured concrete, but the cost is too high. In many cities all over the country, operators are proving to contractors that they can get a better basement wall with ready-mixed-con-

(Continued on page 274)

Use Lime-Proof
MAPICO COLORS
to give your
CEMENT and MORTAR products
Permanent Beauty

These pure, high grade iron oxide pigments are unsurpassed for color, strength and brightness. And they'll help you to Keep Costs Down. Our representatives in principal cities are ready to cooperate. Write for full information.

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BROWNS • BLACK

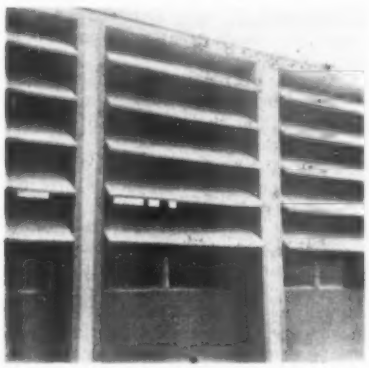
COLUMBIAN CARBON COMPANY
MAPICO COLOR DIVISION
MANUFACTURER

BINNEY & SMITH CO., Distributor
41 EAST 42nd STREET, NEW YORK, N. Y.

Precast Specialties

(Continued from page 259)

testing laboratory. A sample of reports showed 4900 p.s.i. after three days curing and 6243 p.s.i. after eight days. This is above average and considerably above company minimum



Example of a curtain wall; the entire wall is precast in sections, then placed on the floor slab and grouted together

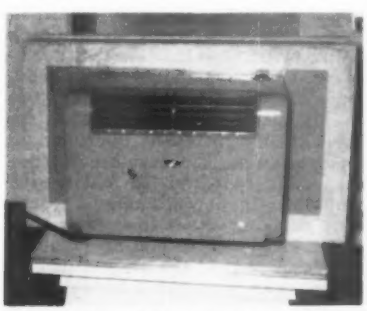
requirements of 4000 p.s.i. after three days and 5500 p.s.i. after eight days.

The company has developed precast products other than the window frames. Precast structural pieces, arches, beams and frames of any shape or form are being made according to individual specifications. One item, a concrete fence, is gaining widespread approval. Posts and two rails for the fence cost less than $1 per ft., plus erection.

The company is also manufacturing bus benches for the Miami area. Most are made entirely of concrete, though some are made using wood seats with concrete ends. These benches are not subject to damage, theft, assaults by hurricane or even motor vehicles. Each end piece weighs 285 lb.

The latest precast product developed is a series of panels for curtain walls. The panels are made on the same principle as the window frames but they extend from the foundation to the roof. A series of these units is set in place and joined with concrete to form a solid wall.

John Lewis is president of Livesay Window Co. and Jack Plunkett is vice-president.



Demonstration of the manner in which an air conditioning unit fits in a precast concrete frame

"Buck" that STIFF COMPETITION

with the

KENT STANDARD BLOCKMAKER

ONE MAN OPERATION

Place the pallet—push the button to start cycle—transfer finished block to the rack, while the next block is made.

AUTOMATIC CYCLING

Push-button starts cycle of automatic operations in sequence.

LOW OPERATION COST

Comparatively low power requirements result in economy of operation.

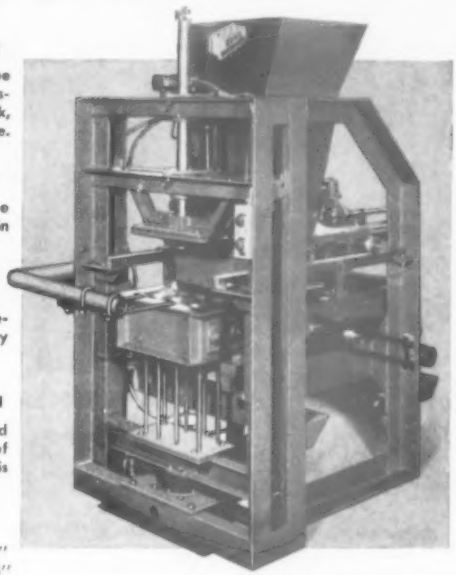
DESIRABLE PRODUCTION

One block can be produced in 10 seconds. Production of up to 360 blocks per hour is possible.

BLOCK SIZES

Per cycle—2-4" blocks; 2-6" blocks; 1-8" block; 1-10" block, or 1-12" block.

SIMPLE CHANGE OF MOLD BOX



A small investment gives you BIG OPERATOR ADVANTAGES with the KENT STANDARD BLOCKMAKER.

Check your present plant setup and write for complete information. Learn how smart block plant operators everywhere are making "sweet" profits in the face of tough competition with this rugged, versatile machine.

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CONCRETE PRODUCTS MACHINERY

Cuyahoga Falls, Ohio

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

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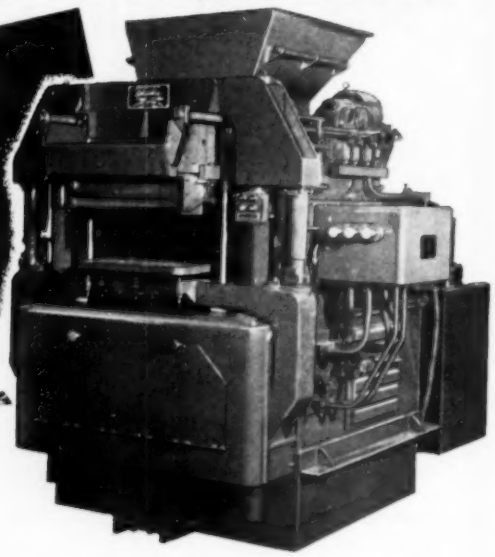
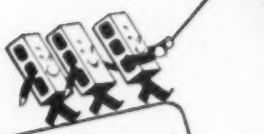
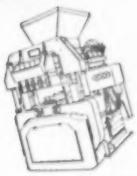
EXCEEDS 4 CYCLES per minute!

Columbia
New, Fully-Automatic
3
BLOCK





Columbia LINE
MACHINES FOR THE
BLOCK-MAKING INDUSTRY



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- Automatic Block Splitters.
- Batch Mixers, 12, 18, 25 and 50 cubic foot sizes.

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...gives you fast, profitable production of quality blocks on a low cost basis!

Columbia's rugged construction, precision tooling, concealed parts, keep maintenance costs down and step-up production standards to a new, profitable high! Here are more reasons why Columbia's new 3-block machine gives outstanding performance: Standard Plain Pallet • Removable Plunger • Controlled Vibration • Hydraulically Operated • Manuel Controls for Clean-up • Automatic Height Control • Twenty-Minute Mold Change. These and more make Columbia the leader in its field!

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CONCRETE BURIAL VAULTS

BERG VAULT SYSTEM

BERG VAULT CO.

ROCK PRODUCTS FEATURES TIMELY INDUSTRY NEWS EACH ISSUE

Sales Policy

(Continued from page 272)

crete at concrete *block prices*. If masonry walls are still most widely used in your city, here is a great new profitable market for your product. To develop the full possibilities of this new market you should lay the proper groundwork. This is how pouring house basements greatly increased one operator's sales.

The producer pointed out that poured basement walls would be more impermeable to the passage of water and would be more sound from a structural viewpoint. He explained that basement masonry walls are inadequate in facing lateral pressure. His studies developed the probability that the cost of poured basements could compete favorably with those of masonry construction. He made a survey which indicated that poured basements could easily gain the acceptance of both the home owner and the contractor. His records showed that premium pay to cement finishers for overtime work had been cutting sharply into the length of his own daily operation. The operator had been seeking ways of getting increased afternoon business. He concluded that the pouring of residential basements could be made largely an afternoon operation.

The producer knew that certain highly satisfactory building forms called for the constant use of ties and rods. He determined that the sales of these rods and ties could be profitably handled. He decided that a properly executed program could develop a new annual market for his concrete which would increase his sales substantially.

Realizing that the execution of his program depended on the cooperation of many contractors, he contacted all whom he felt would be interested. He went to work on those who reacted favorably. His own service men and sales representatives were thoroughly indoctrinated. Necessary explanatory meetings were held with the contractors. Outside specialists led the discussion. Arrangements were made for several trial jobs.

Factory trained technicians supervised the preparation of the forms and assisted in laying out the first foundations. As jobs got under way, actual pouring hours were posted to attract the attention of the building industry. Special advertising announced the availability and advantages of poured foundations.

This operator and others like him have greatly increased their annual concrete sales. The business of merchandising rods and ties has proved profitable. In a continuance of such alert thinking, other lines have been added and other marketing possibilities developed. At the present time, it would seem that three great possibilities lie in the fields of prestressed concrete, prefabrication of concrete panels and tilt up construction.

Concrete for Ohio Turnpike

THE CONCRETE VS. ASPHALT BATTLE over the paving of the proposed 241-mi. Ohio Turnpike was finally ended June 3, when the Ohio Supreme Court, by unanimous vote, reversed the decision of the Second District Court of Appeals of that state requiring the Ohio Turnpike Commission to take bids on both concrete and asphalt paving.

The turnpike will be built of 10-in. portland cement concrete on a 6-in. granular subbase, as recommended by the consulting engineers for the project and the Ohio highway director, and as formerly approved by the commission on September 4, 1951.

The suit against the commission had been brought by Richard H. Shafer, owner of several asphalt plants along the proposed turnpike route, and also a leader in the Ohio asphalt industry. The Shafer suit was the last in a series of legal actions which had hampered the commission since its inception.

It was estimated by the principal underwriters of the turnpike bonds that the delay caused by the Shafer suit has cost the commission in excess of $1,700,000 per month in loss of toll revenues, while interest payable on the bonds, which were issued in July, 1952, has continued to accumulate at the rate of $882,917 per month.

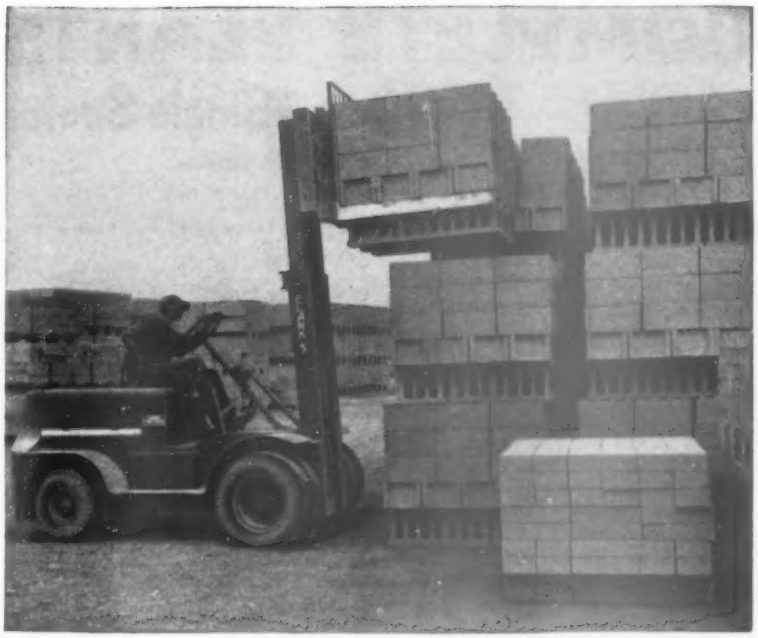
The Supreme Court also ruled that the commission had wide discretionary powers in the selection of materials on which it wished bids to be taken, a point which has been closely watched by engineers and highway officials in other states which have been contemplating toll roads. The requirement of alternate bids would have involved costly duplication of plans, designs and specifications for two or more types of materials in order to receive bids on each.

The Ohio Turnpike will extend from the Pennsylvania Turnpike to the Indiana border where it will join with the proposed Indiana Turnpike which is currently under consideration and, when built, will complete the system of multi-lane highways extending from New York to Chicago.

Nebraska Masonry Meetings

THE NEBRASKA STATE CONCRETE MASONRY ASSOCIATION was recently host to three meetings of architects in Omaha, Lincoln and Grand Island. Principal speaker for all three meetings was William P. Markert, director of promotion, N.C.M.A., who discussed the history of concrete masonry construction and the important developments it has made in the building industry.

Following the three separate meetings, the association held its monthly meeting in Omaha, at which time the proposed program of promotional activities of the National Concrete Masonry Association was discussed.



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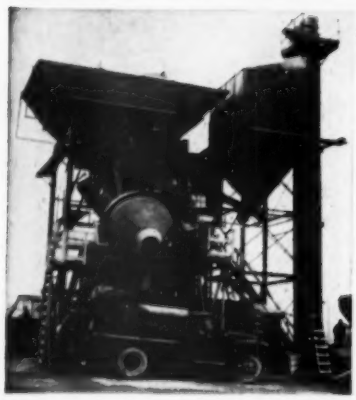

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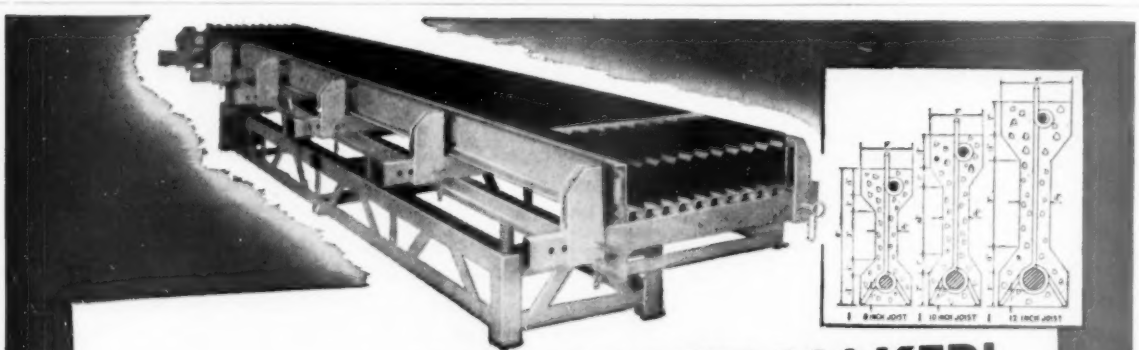
Concrete Masonry Homes

THE CONCRETE PRODUCTS ASSOCIATION OF MICHIGAN recently published a booklet containing the prize-winning designs for concrete masonry homes which were selected from drawings submitted by Michigan architects, designers, draftsmen and students of architecture in a concrete masonry home design competition conducted by the association with the assistant sponsorship of the Michigan Society of Engineers.

The competition, which offered over $3000 in prizes, called for the design of a one-story, full basement, 3-bedroom home not to exceed 1100 sq. ft. in area, and designed specifically for an average American family. Twenty-six home designs, including the 13 prize winners, are included in the publication. The designs, as well as other included material, were arranged, prepared, assembled and published by the association.

Ready-Mix Plant

A READY-MIX CONCRETE PLANT, to be operated under the name of Ready-Mix Concrete Products, is being built at New Lexington, Ohio. The plant will incorporate a 400-bbl. bulk-cement bin, a 100-ton capacity aggregate bin and an aggregates bucket elevator of 80-t.p.h. capacity. Plant equipment will also include three transit-mixer trucks.



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Cash in on the ever-growing demand for steel-reinforced concrete joists. Your experience and contacts in the building trade should make it easy to build up a profitable business in this new line. Concrete joists are simple to make, have unusual strength, are termite proof. The KIRK & BLUM Type "S" Heavy Duty Vibrating Table is capable of multi-production of concrete joists, allowing a fine profit-margin. Easily produced by unskilled operators. For complete details and prices, write to The Kirk & Blum Mfg. Co., 3210 Forrer Street, Cincinnati 9, Ohio.

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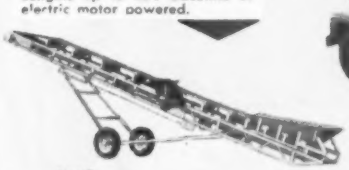
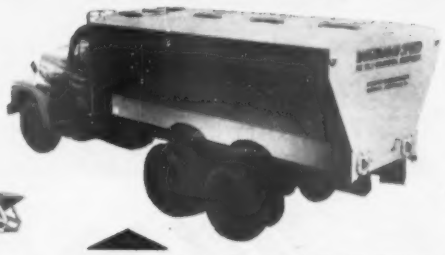
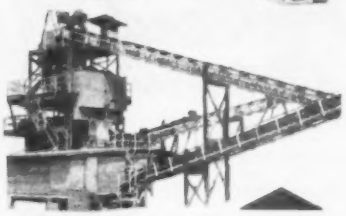




MODEL TST-10 BULK TRANSPORT BODY. For hauling cement. Has twin auger discharge for automatic self-unloading. Lengths up to 35'.

MODEL 195 CAR UNLOADER. Unloads from full length of freight car. Chain and flight conveyor gives fast discharge and can be integrated with other Bau-hman Equipment



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MODEL 210 BELT AND BUCKET CONVEYOR. Sectional "Job-fitted" Belt and Bucket Conveyor with spaced or continuous buckets. Open or enclosed leg.

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Seattle Concrete Pipe Co. is manufacturing pre-cast concrete beams that weigh ten tons and are forty feet long. Moving these cumbersome units about the plant proved an easy job for their 9-ton Gerlinger Lift Truck.

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As white as snow

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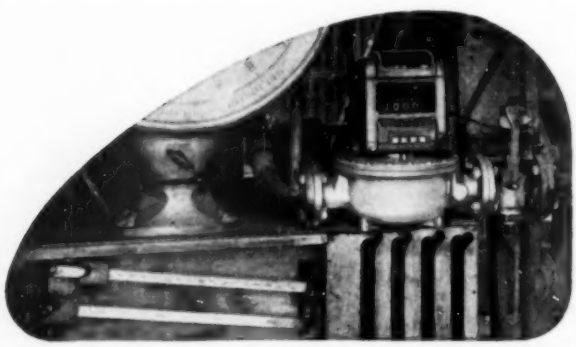

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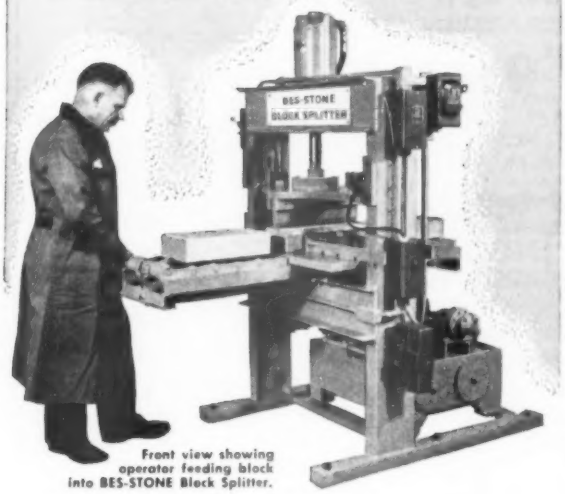

Front view showing operator feeding block into BES-STONE Block Splitter.

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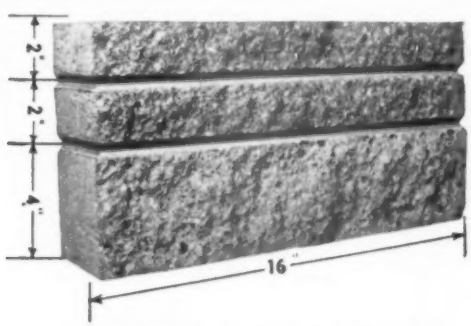
- **Has a Powerful Hydraulic Action**
- **Combines Quiet Operation with Safety**

Here is another Besser machine — the BES-STONE Block Splitter — designed primarily for the Concrete Products Industry. The machine splits block with speed and precision, in a variety of modular sizes. It's fully automatic. The block is placed under the knife automatically . . . the blade descends with a smooth, hydraulic action . . . and the split block is ejected by the incoming block. The operator is always at a safe distance. The BES-STONE Block Splitter enables plant operators to offer additional lines and affords new profit possibilities. Write for Bulletin No. 95A.



BES-STONE in Modular Sizes

BES-STONE, the product of the BES-STONE Block Splitter, is a new masonry unit with a split-stone appearance, made in many sizes and in a series of attractive, permanent colors. You'll find it complements, and greatly increases your sales of standard stripper block.

BESSER

Complete Equipment for Concrete Products Plants

BESSER MFG. CO., ALPENA, MICH., U. S. A.

new truck-man 40

designed . . .

. . . FOR CUBING AND LOADING BLOCKS

THAT'S RIGHT, the new Truck-Man Model 40, two ton, High Lift was designed from forks to engine, especially for handling blocks. It is not just another industrial truck with special forks.

BIG 7.50 x 15, 10 ply Road Lug pneumatics on the drive wheels and 6.00 x 9, 8 ply rib pneumatics give you plenty of traction and footing for yard work. The big Ford engine, for ample power, and the short, 72", turning radius for peak maneuverability, mean that the Truck-Man 40 will really do a job in curing kilns and plant as well.

HERE ARE THREE BIG REASONS WHY THE 40 IS EASY AND ECONOMICAL TO MAINTAIN, TOO:

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2 ACCESSIBLE — The tilt cylinder is mounted above floor decking for easy adjustment or service. Clutch, transmission or axles are removed in minutes for bench repairs. No need to pull engine for work as head and oil pan are easily removed.

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Write or check coupon and mail for catalog with complete details on the Model 40 and 8 other versatile Truck-Man trucks.

truck-man

Div. of The KNICKERBOCKER CO.
650 Liberty St., Jackson, Michigan

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☐ Send Catalog and Further Information

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CLASSIFIED ADVERTISEMENTS

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Located central San Joaquin Valley, Fresno Co., California, 16 miles southwest of Fresno. 15 year old sound and healthy going business, fully equipped, highly efficient manufacturing and installation operations. 5 men manufacture, cure and load 1800 to 2000 feet of 10" by 3' light pipe per day—indicating why this is one in a 100.

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H. G. HOLSTON, Owner

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CARUTHERS, CALIFORNIA. PHONE 35

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Advertising necessities for the block industry. Line Pins, Twigs, Modular Coursing Stick. Also the new Block Calculator and Wood Corner Block. All imprinted with your advertising. Complete catalog on request.

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Equipment for a complete block plant. A Miles face-down block machine and a Miles stripper. One bag mixer, elevator; 600 steel 12" pallets; 2200 wood pallets, 8", 10", and 12". Erickson Hi-Boy lift truck, like new. Ford tractor and loader. 1948 Studebaker truck with steel bottom and hoist. 4 motors, a five, three, two and a one horsepower. A hopper that holds about 10 yds. gravel. All in good condition.

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ARKANSAW, WISCONSIN

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With U.B. Line stretchers the most economical way, to keep your name before your mason's and mason contractors every working day of the year. Line pins, twigs, corner ties, and tools for the Blocklayer.

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UNBREAKABLE PALLET RINGS

Write for full information
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2 — Block Lith-I-Block Machines, complete with all attachments.
70 — 60-block steel racks.
2100 steel pallets.

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LANDERS-SEGAL COLOR CO.
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INDUSTRY TRENDS
THROUGH
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"SHALITE"

An expanded shale aggregate for lightweight block and concrete

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Clark Concrete Construction Corporation
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(1) Concrete pipe machine—12"—72" diameter, 4 ft.—8 ft. lengths (2) Besser Mixer. (3) Besser Skip Loader. (4) Wire Roller. (5) Boiler, etc. Guaranteed A-1 condition.

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the Recognized Authority of the Non-Metallic Minerals Industry

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CEMENT COLORS
MORTAR COLORS
made by
BLUE RIDGE TALC CO., INC.
Henry, Virginia

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40—Concrete Block Racks.
1—12 cubic foot Skip Hoist.
1—45 foot Bucket Conveyor with Rubber Belt.
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Two ready-mix concrete plants priced for immediate sale. Located in Pulaski and Lawrenceburg, Tennessee, eighteen miles apart. Lawrenceburg also has complete block plant. No competition. Equipment in excellent condition.

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FOR SALE

1—Champion Tile Machine with Meyer-Bussey Feeder, complete with motors and attachments. Used very little. Good condition.
1—Bonded Scale Cinder Crusher. Good condition.
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Vibrapac in good running condition. Includes Oswalt speedup with 10 H.P. vibrator motors. May be seen any time.

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A LIFETIME OPPORTUNITY

Make $1,000 monthly as easy as rolling off a log, building blocks in Real Stone Color and Design in your back yard. Also applying stone siding, cost only $6.00 per square, deposit for equipment only $300.

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LOWER COST
PACKER-HEAD WINGS
Proved to last as long or longer—yet cost considerably less. Write for prices.
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A large New Jersey Concrete Concern has an opportunity for a ready mixed concrete truck Dispatcher, must be experienced. Please write in care of BOX L-43, ROCK PRODUCTS, 309 West Jackson Blvd., Chicago 6, Illinois.

Exceptional Going **BUSINESS OPPORTUNITY**

ALLIED WITH OUR READY-MIX CONCRETE BUSINESS, CEMENT CONTRACTING AND BUILDING MATERIALS, WE OWN TWO VALUABLE MANUFACTURING AND SALES FRANCHISES IN THE PRE-CAST CONCRETE FIELD, WITH AN ACTIVE DEALER ORGANIZATION EXTENDING OVER THE SURROUNDING TERRITORY. THE AVERAGE GROSS SALES FOR EACH OF THE LAST FIVE YEARS WAS APPROXIMATELY $135,000, AND THE NET PROFIT HAS SHOWN A STEADY INCREASE. WOULD BE A FINE MONEY-MAKER FOR A FAMILY OF AGGRESSIVE INDIVIDUALS, SINCE TWO WORKING PARTNERS COULD EACH NET WELL OVER $10,000 PER YEAR, BASED ON PRESENT EARNINGS. FACILITIES AND EQUIPMENT INCLUDE:

THREE ALMOST NEW 3-YD. MIXERS, ATTRACTIVE MODERN OFFICE BUILDING, TWO RR SIDINGS, 225 TON (Bucket-Elevator Charged) AGGREGATE HOPPER, TWO FLAT BED TRUCKS (One nearly new International), ¾ TON PICK-UP, ONE 36' x 70' CONCRETE BLOCK BUILDING FOR MANUFACTURING PRE-CAST PRODUCTS, AND SEPARATE BOILER BUILDING AND BOILER. ALL IDEALLY LOCATED ON PREMISES WITH AMPLE ROOM FOR FUTURE EXPANSION. SITUATED IN WESTERN ILLINOIS CITY IN THE HEART OF A PROSPEROUS AGRICULTURAL AREA, WITH INCREASING INDUSTRIAL POTENTIAL. THIS BUSINESS COULD NOT BE DUPLICATED FOR $150,000. ASKING PRICE: $125,000.

BOX L-78, CONCRETE PRODUCTS, 309 W. JACKSON BLVD., CHICAGO 6, ILLINOIS.

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231—8"x16" Cast aluminum open ends	@	.65
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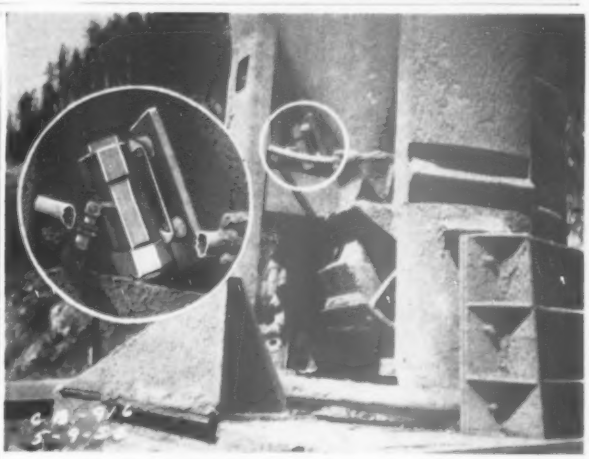
ROCK PRODUCTS

HAS THE LARGEST ABC CIRCULATION AND HIGHEST RENEWAL PERCENTAGE IN THE NON-METALLIC MINERALS INDUSTRY



"We Finished on time, thanks to BRANFORD Vibrators"

That's what the contractor said. He was constructing a large hydro-electric dam in the Pacific northwest. A big volume of concrete had to be poured before the Spring high water.

The huge buckets he was using would discharge in about 2½ minutes but that wasn't fast enough. Even with a round-the-clock schedule, the job couldn't be done on time.

However, by installing powerful BRANFORD vibrators (3" dia. piston) on the buckets he emptied them in 15 seconds and beat the deadline!

BRANFORD vibrators will help you break similar bottlenecks.
Write for our latest literature.

The BRANFORD Company
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(Filler for Floors and Roofs)

Opens Up New Markets

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- PERMANENT
- RIGID
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Gives FLOORS and ROOFS Lifetime Permanence . . . Cuts Construction Costs!

Your profits will greatly increase by making and selling Soffit Filler Block for floors and roofs. Soffit Block enables your customers to make an ENTIRE structure firesafe and permanent, and do it economically.

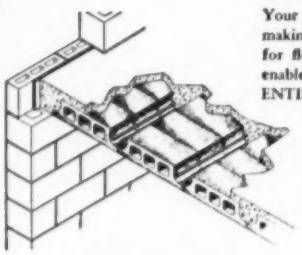
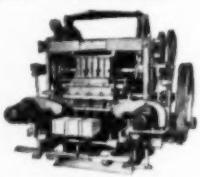


Illustration at left shows integral joist and slab of reinforced concrete. Meets standard building code requirements. Recommended by architects and builders.

BESSER VIBRAPAC

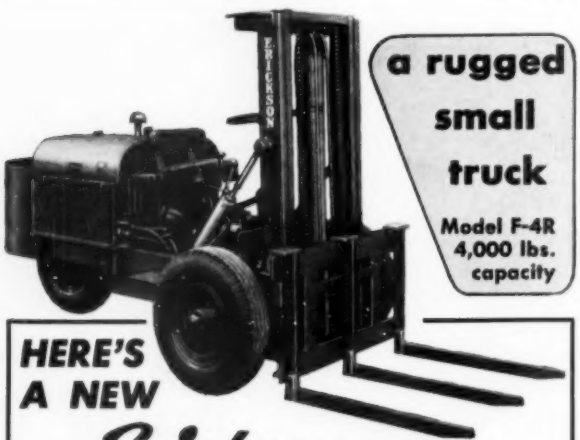
Soffit Filler Block are made on the same machine that produces quality concrete load-bearing block for walls, in all styles and sizes, using one set of Plain Pallets. Write for literature and names of Vibrapac plants making Soffit Block.



BESSER MANUFACTURING CO.

ALPENA, MICHIGAN, U. S. A.

Complete Equipment for Concrete Products Plants



a rugged small truck

Model F-4R 4,000 lbs. capacity

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For tricky ramps, rough or soft ground, cramped quarters—you will quickly become a booster for Erickson F-4R ease of handling, traction, balance, ruggedness. Comfortable seating space reduces operator fatigue. The F-4R is designed for more work per day—built for lower cost per year. Erickson quality is economy for you! Forks, mast and lift heights as ordered, twin tilt cylinders, 4 speeds forward, 4 speeds reverse. Side-shifter, scoop and other attachments available.

Send for Erickson Catalog on platform trucks to 7000 lbs. cap. and fork models 2000 to 20,000 lbs. cap.

- Short Wheelbase & Turning Radius
- Complete Operator Vision
- Large 10-Ply Pneumatics
- 12" Center Undercleorance
- Amazing Ease of Handling

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Erickson THE WORKHORSE OF LIFT TRUCKS

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FAST AND CLEAN DISCHARGE of even the lowest slump concretes is made possible by the patented blade design of this Worthington Hi-Up Truck Mixer, one of a fleet owned by the McNamee Ready Mixed Concrete Co. of Xenia, Ohio.

"Drivers, shop men, customers—everybody likes our new Worthington HI-UP Truck Mixers"

Says Charles F. McNamee of the McNamee Ready Mixed Concrete Co., Xenia, Ohio

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Mr. McNamee goes on to say:

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We've been getting letters like this from Worthington Hi-Up Truck Mixer users all over the country. Why not find out for yourself about these modern Blue Brutes. Get the facts from your nearest Worthington distributor, or write directly to Worthington Corporation, Construction Equipment Division, Section R.3.6, Plainfield, N. J.

R.3.6

WORTHINGTON

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V-BELTS • QD SHEAVES • AIR COMPRESSORS • CENTRAL MIXERS • VERTICAL TURBINE PUMPS • CIRCULATING PUMPS

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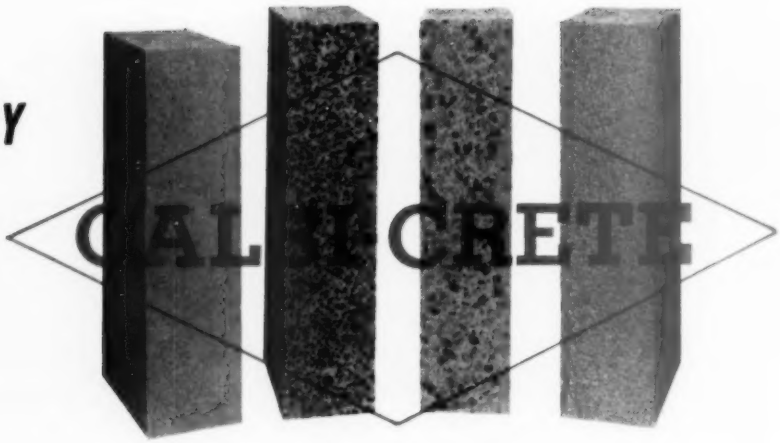
REVOLUTIONARY



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CALSI-CRETE'S versatility makes it ideal for a wide range of building uses, including load-bearing building blocks, roof planks, insulating roof slabs, cores for firedoors and partitions and many other applications. Calcium silicate hydrate products made by the **CALSI-CRETE** process offer these outstanding advantages over other building materials:

1. **Light but strong, with high thermal and sound insulation qualities. (K factor for 45 lb. per cu. ft./load-bearing CALSI-CRETE is only 1.1 Btu./Ft.^{2} hr. compared with 9.1 for dense concrete)**
2. **Stable, durable, fireproof and hygienic.**
3. **Great resistance to water penetration and frost action because of unicellular structure. Cracking is avoided by negligible wetting and drying movement, least of any known building material.**
4. **Can be cut, sawed, drilled, chased, screwed and nailed, and provides an excellent key for plastering and rendering.**
5. **Cost is less than brick, dense concrete or wood in finished construction.**
6. **Easily made with raw materials abundant in virtually every part of the country.**
7. **Ease of handling lowers production and utilization costs.**
8. **For applications where load-bearing is not a factor, CALSI-CRETE can be made with 20 lb. per cu. ft. density and a K factor of 0.6.**

Autoclaved calcium silicate hydrate products are now being introduced in the United States after years of successful use in Sweden and England as high quality lightweight concrete building materials.

Write for information on franchises or bulletin describing this new material.

CALSI-CRETE *corporation*

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OF FUEL -to- CEMENT

In these days of increasing fuel and labor costs, every economy you can make is important. Here is a sure way to SAVE FUEL. Cambridge Gas Analyzers will provide the Burner with a continuous and simultaneous record of the oxygen, carbon dioxide, and combustibles in the flue gas. O_2 analysis serves to warn against excessive air supply; combustibles analysis indicates oxygen demand under all conditions; CO_2 analysis reflects state of calcining process. Cambridge Instruments make uniform kiln operations possible with ease. Savings effected pay for installation in short time.

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HAYWARD BUCKETS

WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
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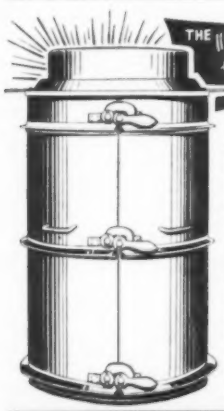
New York, N. Y.



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ACCURATE • DURABLE • ECONOMICAL

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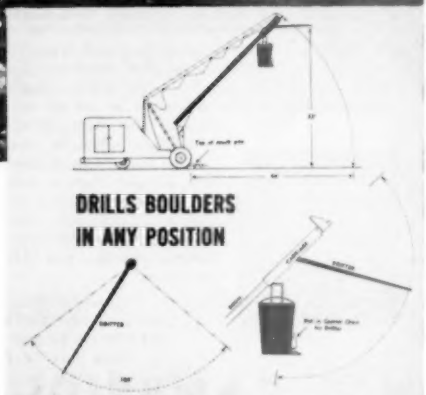

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The TRAVEL DRILL Co., Inc.

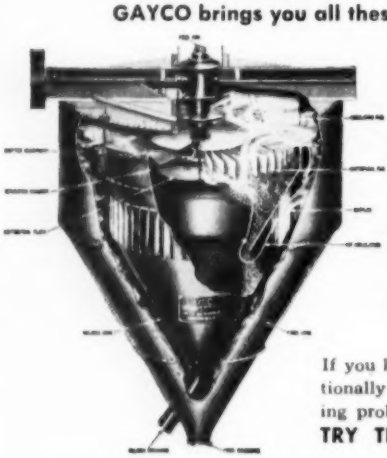
P. O. BOX 1124 RALEIGH, N. C.

GAYCO CENTRIFUGAL SEPARATORS

GAYCO Separators, equipped with the adjustable centrifugal sizing fan — an exclusive GAYCO feature — make closer separations. Closer separations bring about higher production through efficient removal of the fines made by the mill. Closer separations bring about higher quality products by eliminating all undesirable oversize.

"TIMKEN BEARING EQUIPPED"

GAYCO brings you all these:



- Range 60 to 400 mesh
- Greater Capacity
- 25 to 30% greater production
- Cleaner Tailings
- Uniform Products
- Slow speed for slow wear
- Quick and easy adjustments

If you have an exceptionally hard separating problem,
TRY THE GAYCO.

UNIVERSAL ROAD MACHINERY CO.
Rubert M. Gay-Division
Factory and Laboratory, Kingston, N.Y.
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with

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Wet Water

for

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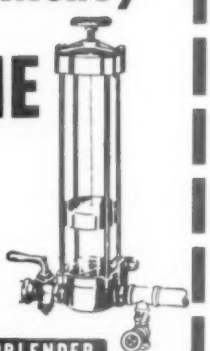
- BLENDING
- MIXING
- WASHING



The HYDROBLENDER

You'll have increased production because of smoother mixing, fewer rejections, and reduced breakage.

Saves water and is simple to use with our specially designed Hydroblender.

If you're interested in lower costs with Aquadyne, write for free booklet, "The Theory of Wet Water."

AQUADYNE CORPORATION

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CLASSIFIED ADVERTISEMENTS

Cancer strikes 1 in 5

Strike back

Give

Your gifts to the American Cancer Society help guard those you love.

Your dollars support research in a hundred laboratories and universities . . . spread life-saving information . . . ease pain and suffering . . . provide facilities for treatment and care of cancer patients.

It is a sobering fact that cancer may strike anyone tomorrow: strike back today with a gift to the American Cancer Society. You may mail it, simply addressed CANCER, c/o your local post office.

American Cancer Society

CARLYLE
INDUSTRIAL RUBBER PRODUCTS FOR EVERY PURPOSE

IMMEDIATE DELIVERY OF CONVEYOR, ELEVATOR AND TRANSMISSION BELTING — FIRE, WATER, SUCTION, AIR, STEAM AND WELDING HOSE

WHY WAIT

We have 8 to 48

RUBBER CONVEYOR BELTING

TOUGH COVERS—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulcanized to the carcass to assure utmost performance, economically.

STRONG CARCASS — Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation.

FLEXIBILITY — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following desirable features; troughs easily, runs true on all idlers, gouge resistant, excellent for long and short hauls and slope installations.

Avoid delays in your production schedules!

We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches.

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

INQUIRE FOR SIZES NOT LISTED. ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK

All our belting made by the leading belting manufacturers.

Write for Free Booklet on Installation, Care & Maintenance of Conveyor Belting.

SEND US YOUR INQUIRIES FOR OTHER RUBBER PRODUCTS.

CARLYLE RUBBER CO., Inc.
62-66 Park Place, New York 7, N. Y.
Phone: Digby 9-3810

PRICED TO SELL

1—160' Gardner-Denver Air Compressor, steel wheels.
1—Gardner-Denver Wagon Drill, steel wheels.
1—Earber-Greene Bucket Loader, full crawlers.
1—2" Jaeger Piston Pump, 110 lbs. pressure.
1—2½" Barnes Piston Pump, 500 lbs. pressure.
1—3" Novo Piston Pump, 500 lbs. pressure.
10—1½", 2", 3", 4" and 6" S.P. Centrifugal Pumps.
1—½ yd. Bay City Shovel, Heavy Duty.
1—Allis-Chalmers WK Tractor with angledozer.
1—Allis-Chalmers W80 Tractor with 8 yd. Scoop.
2—Allis-Chalmers HD7 Tractors with angledozers.
1—Flink Even Seal Spreader for Chips.

ALLEGHENY EQUIPMENT CORPORATION
P. O. Box 1888, Pittsburgh 30, Pa.

Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 5047
Pennsylvania C-4-30 Reversible Hammermill
Cedar Rapids 4033 Hammermill. Diesel powered
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36" x 48" Jaw Crusher.
Traylor TY 4' with 200 hp. electric motor.

DREDGES

Ellicott 12"x16" new pump with new V-12 885 HP Diesel engine. Port. steel hull.
Ellicott 8" with cutter. Diesel Hull 46'x18'x8'6".
8" Hydraulic. Diesel. On 32'x8' steel pontoons.
Amsco 10" Diesel power portable. Excellent.
6" portable Diesel complete with cutters, etc.
8" H P twin Diesel drive. Complete.

CONCRETE PLANTS AND EQUIPMENT

Heltzel 1000 bbl. cement silo with elev. scales, etc.
Smith 56-S two yard tilting mixer. Complete.
Port Erie Strayer Concrete Plant 30-40 T.P.H.
Blaw-Knox 300 ton 4 compt. aggr. bin.
54-B weighbatcher conveyor truck hopper apron feeder bucket elevator.
Butler #7 Cement Track Plant 250 bbl. p.h.
Large plant 212 yd 6 compts. agg. & cement elevators. 56-S Mixer.
Butler 250 bbls. cement bin with B-K 100 ton 3 compt. agg.
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Cedar Rapids Portable Super Tandem, excellent.
Pioneer 40-V. New 1946. Portable. Diesel power
Pioneer WA-300, crushing, washing, screening
Pioneer Portable Plant with 24 x 36 jaw primary and 40 x 22 triple roll secondary. New, 1950.
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾".

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40. Eagle 20x36. Diamond 24x36"
Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20, 12x30, 14x36, 18x36, 36x42. Buchanan 36x42.
Good Roads Reliance 15x30. Traylor 18x36, 24x36.
Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1030, 1040, 1234, 1536.
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36" Gyrasphere, 18", 28". Interstate Telsmith, Telsmith 5H, 10-B, 13-B, 16-B, Kennedy Van Saun 7, 19, 25½-S, 37. Traylor Ty 1'8". Ty 2'4", T-4½"
ROLL: Cedar Rapids 40x20. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18" New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x33. Jeffrey 36x42, Jeffrey 36x24, 36x40. Dixie 3650
BALL MILL: Hardinge 10'x48". K.V.S. 6'x8' Type M Air swept J-H 6'x6'. Hardinge Conical 6'x22". Colorado Iron Works 5'x6'; Marcy No. 64½. Hardinge conical 10'x36".
ROD MILL: March 2'x8', 3'x6'. Allis-Chalmers 4'x8'. Hardinge No. R 206. Marcy 8'x12' Hardinge 8'x22".
CONE: Symons 2' coarse bowl, 3' standard head
TUBE MILL: Smidth 5½x20, K.V.S. 4'x7', Traylor 5'x22'.
DRIERS: Struthers-Wells 7'x24'; others 7'x20' 6'x30' 7'x70'. 6'x40' and Cedar Rapids 60"x24'

SHOVELS—CRANES—DRAGLINES

N-W 80 D 2½ yd. Dragline. Diesel. 100' boom
N-W Model 6, 1½ yd. Diesel Shovel.
Lima Mod 34, 1 yd. Shovel-Crane-Dragline. Gas
Bue-Erie 51-B Diesel Shovel. Practically new.
Northwest 80 D Diesel Shovel 2½ yd. Revamp
Lorain L-820 2 yd. Shovel-Drag Crane 100' Bm.
Northwest 80-D Shovel-Drag. New 1948. Excellent.
Lima 1201, Comb. Shovel-Drag, 80' Bm.
Lima 1201 2½ yd. Diesel Shovel.
Manitowoc 3500, 2½ yd. High Lift Shovel.
Link Belt K 595 dragline. 2½ yd., 8 ft. boom
Bue-Erie 51-B Diesel Shovel. 2½ yd.
Lorain Model MC 414, Moto-Crane, 85' Bm. Exc.

SCREENS

Allis-Chalmers 5'x14' dbl. deck Riple-Flo.
Kennedy-Van S. 4'x10' three deck.
Telsmith heavy duty washer 30"x13'.
Diamond 4'x16' three deck.
Lippman 4'x12' single deck.
Simplicity 4'x10' four deck.
Symons 4'x14' double deck.
Tyler 4'x10' two deck heavy duty, motor, Gen. Set
Robbins Vibrex 3½ deck 4' x 12' Model 48-144.

TRACTORS

2 Cat. D8 Angledozers with DDPCU rebuilt.
Int. TD-18A with H-E Bulldozer.
Int. TD-24 with H-E Cable Bulldozer.
AI-Chal HD19 Angledozer, Hydraulic.
AI-Chal HD7 with Gar Wood angledozer.
Allis-Chal. HD-19 with hydraulic control angledozer
Cat. D4 Tractavator with 1 yd. bucket, hydraulic

LOCOMOTIVES

45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
Vulcan 20 ton standard gauge type 0-4-0 gas.
20 ton Vulcan gas, std. ga., rebuilt.
25 ton Vulcan steam std. ga. Side tank.
15 ton Whitcomb 36" ga. gas.
Plymouth Model 7LDA standard gauge 10 ton diesel.

DERRICKS

Steel 50 ton stiff leg derrick 90' boom. Complete.
American Ferry 20 ton Guy Derrick 100' boom
Clyde 30 ton stiff leg 90 ft. boom
Guy Derrick 15 tons 115' mast 105' boom
American 25 ton stiff leg derrick 90' boom.
Special 35 ton stiff leg derrick 100' boom.
Nat'l. Bridge 30 ton Guy Derrick 100 ft.
American 30 ton stiff leg 100' boom.

ASPHALT PLANTS

B-Green Port. continu. 842 Mixer, 832 Dryer.
Cedarapids 60"x24' asphalt plant drier. Compt
Overmander Monotrole Bit. Mixing Plant, T-34
Model S-100 Simplicity. Diesel powered.
Hetherington-Berner Moto-Paver
Pioneer Model 101, complete. New 1948.
Cummers-Road Semi-Port. 1500# Pugmill.
Cedar Rapids Travel Roadmix Plant Model 50.

CABLEWAYS

Sauerman slack line 1¼ yd.; electric 90' mast
Sauerman 1 yd. with 100 hp. electric motor, complete
Sauerman 1 yd. with Waukesha gas hoist.

RICHARD P. WALSH CO.
10 Church St. New York, N. Y.
Cortland 7-0723 Cable: RICHWALSH

Conveyors - Idlers - Belting

Immediate shipment from stock

TROUGHING IDLER CONVEYORS

We will take our loss on our stock of short length belting and previous model idlers. You can save as much as 50% by buying the BONDED CONVEYOR SPECIALS listed below and accepting your conveyor belting in two pieces. Idlers belting and conveyor sections are all new.

Quantity	Belt Width, Inches	Length of Conveyor, Feet	List Price	Sale Price
1	18	25	$1229	$ 658
1	18	35	1559	814
1	18	50	2054	1043
1	18	85	3269	1581
1	18	135	4529	2096
1	24	25	1322	739
1	24	30	1507	824
1	24	45	2062	1085
1	24	65	2721	1451
1	24	85	3542	1806
1	24	100	4097	2037
1	30	25	1421	806
1	30	35	1841	997
1	30	50	2471	1588
1	30	65	3101	1617
1	30	80	3731	2295
1	30	100	4571	2768
1	30	125	5621	2818

Belting is 4 ply, 28 oz. duck, 1/8" top rubber cover and 1/32" bottom cover.

BUILD YOUR OWN CONVEYORS

3-roll Troughing Idlers for these sizes:

16" belt	$17.25	30" belt	$19.50
18" belt	18.00	36" belt	20.25
24" belt	18.75	48" belt	21.75

1-roll Return Idlers for these sizes:

16" belt	$6.75	30" belt	$8.25
18" belt	7.13	36" belt	8.75
24" belt	7.50	48" belt	10.25

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. Rust proof ball races; maintenance is negligible.

HEAD AND TAKEUP PULLEYS

All welded steel head and tail pulleys, and assemblies complete. Priced from $60.00

CONVEYOR BELTING

Famous brands at deep cut prices. Fresh stock.

Width	Ply	Top Cover	Bottom Cover	Duck Carcass	Price
14"	4	1/8"	1/32"	28 oz.	$2.30/ft.
16"	4	1/8"	1/32"	28 oz.	2.40/ft.
18"	4	1/8"	1/32"	28 oz.	2.50/ft.
24"	4	1/8"	1/32"	28 oz.	3.23/ft.
30"	4	1/8"	1/32"	28 oz.	3.97/ft.

MOTOR TRUCK SCALES

20 Ton Truck Scales	$525.00
26 Ton Truck Scales	582.00
33 Ton Truck Scales	825.00

Others to 50 ton capacity. All complete with structural steel weighbridge.

VIBRATING SCREENS

Heavy duty eccentric-shaft types; 1 to 5 decks, 3'x8' to 5'x14'. Others from 2'x4'. Wire cloth or plate included to yoer specifications.
Priced from $431.00

PAN AND RECIPROCATING FEEDERS

Complete with motor and drive. 15 to 225 tons per hour capacity. Priced from $423.00

Mfrs. of Scales, Conveyors, Conveyor Parts, Idlers, Vibrating Screens, Crushers and Feeders

WRITE FOR CATALOG AND PRICES

BONDED SCALE AND MACHINE CO.
128 BELLVIEW COLUMBUS 7, OHIO
PHONES: GArfield 2186; FR. 6-8898, Evenings

Quarry Equipment

2540 Cedarapids 4A primary unit, diesel power.
2036 Cedarapids AAA portable primary, diesel power.
1036/2618 Cedarapids Jr. Tandem on rubber.
Cedarapids Rock-It plant w/2025 jaw, 3033 hammermill.
2020 Cedarapids double impeller. New condition.
4024 Cedarapids roll. Rebuilt.
2018 Cedarapids roll. Rebuilt.
1038 Cedarapids jaw.
1036 Telsmith Wheeling.
10x7 Allis-Chalmers Blake type jaw crusher. Rebuilt.
#1 Cedarapids Kubit impact breaker. New condition.
B-3 Jeffery swing hammer pulverizer. Rebuilt.
60" dia. x 14' Traylor revolving screen. Rebuilt.
24" Wemco single pitch sand screw. New condition.
15 cu. yd. Cedarapids sand drag. New.
16"x90' bucket elevator.
60-ton, 2-comp., 8'x18' storage bin w/clam gates.
Special bins to your specifications.
Conveyors—18"—24"—30"—36". Also belt.

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Lorain 77, 1½-yd. diesel.
Lorain 75B, 1¼-yd. diesel.
Lorain L-50-I, 1-yd. diesel.
Lorain MC-4 Moto-Crane.
Lorain 40 truck crane on Mack 3-axle truck.
Link Belt LS85 Diesel Combination.
Unit 514, ½-yd. gasoline crawler shovel, rebuilt.
Lorain 30A, ⅜-yd. gas combination.

WELL DRILLS & TOOLS

Sanderson-Cyclone No. 42 well drill, new.
Sanderson-Cyclone No. 44 well drill, new.
1952 Model 40 Keystone w/truck & tools.
Used Model 42 Sanderson-Cyclone well drill on Dodge truck.

TRUCKS

27FD rear dump Euclids.

AIR COMPRESSORS

500 cu. ft. Gardner-Denver diesel, rebuilt.
365 cu. ft. Gardner-Denver. New condition.
105 cu. ft. Schramm gas powered on 4 steel wheels.
Worthington 2-stage, water-cooled, vertical 250#, 60 CFM, new condition.

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CAMP HILL, PA.
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Westinghouse 15 hp. gearmotors, 125 rpm.
Electric motors up to 125 hp.
Alternator, 40 hp. 115 volts DC, motor 3/60/450 volts 31.3 KVA.
Selected lot of standard gear reducers.
10 hp. gear reducer with 1600-1 ratio.
5 overhead electric and air hoists.
Single drum electric hoists, 1½ to 7 hp.
Link Belt 5 hp. car puller.
Enclosed and open belt or chain bucket elevators.
Elevator buckets, chain, sprockets.
New elevator belt from 8" to 18" wide.
New conveyor equipment for 14", 16", 18" and 24" belt.
Used equipment for 30", 36" and 42" conveyors.
New and used conveyor belt up to 36" in width.
Belt tripper for 14" conveyor.
Apron conveyors: 18"x7', 24"x46', 30"x22'.
Flat idlers for 20" and 42" belt.
Merrick 16" and 30" conveyor scales.
Pumps, bin gates, trolleys.
Gravity conveyors, gears and sprockets.
American Standard 24" Disintegrator.
Single Deck 4'x6' vibrating screen.
Single deck 6'x8' scalping vibr. screen.
Symons 1½ deck 42" x 14 ft. vibrating screen.
Universals new single and double deck vibr. screens.
Double drum 50 hp. Hunts Tandem hoist.
Single and double roll coal crushers.
Stedman B30 hammermill, 30"x24".
Penna SXT-8 hammermill with 125 hp. motor.
Gruendler 2XA hammermill, 24"x14".
Double roll stone crusher, 24"x14", smooth.
Bonded double roll cinder crusher, 12"x18".
Sturtevant Fine Crusher, 00, with 2 hp. motor.
Champion 1030 roller bearing jaw crusher.
Pump 14" centr. 7500 gpm. 1170 rpm., 220' head.

G. A. UNVERZAGT & SONS
136 Coit St., Irvington, N. J.

STOCK SPECIALS

For Sale or Rent

1—P & H Model 855 Crawler Shovel, 2 yd. capacity, Cat. Diesel power. Reconditioned. Crane boom available.

1—P & H Model 700 Crawler mounted Crane, 1½ yd. capacity. Gas power. Good all-around condition.

1—Osgood, 1 yd. Crawler Hoe & Crane, 50' boom. Gas Power. Good Condition.

1—Bay City Model 45 ¾ yd. Crawler Hoe-Shovel-Crane. Late model in perfect condition. G. M. or Cat. Diesel Available.

1—Link-Belt Speeder Model D-4 Crawler Crane, 40 ft. boom, Cat D-8800 diesel engine. Reconditioned.

1—Koehring Model 301 Crawler Mounted Crane, ¾ yd. capacity. Gas power.

1—Bay City Model 30 Heavy Duty ½ yd. Crawler Shovel or Hoe, gas power. Reconditioned.

1—Bay City Model 15 T40 Crane, mobile, ½ yd. capacity, available with hoe attachment or crane boom. Late model in excellent condition.

1—Browning Truck Mounted Crane 10 ton capacity Model "E," powered by Cummins diesel and mounted on 10 wheel Mack chassis. First class condition throughout.

1—Universal Truck Crane, 28 ft. Boom, mounted on A. C. Mack Chassis. Single axle rear.

1—Bay City Model 65 or 650 shovel attachment with 1¼ yd. shovel dipper. Practically new.

1—P & H 255A Hoe Attachment. Practically new.

Clamshell Buckets, ⅜ to 2 cu. yd., also several Crane Booms—Trench Hoes and Shovel Attachment—Assorted makes.

1—D7 Crawler Tractor, 7M series, LeTourneau cable operated blade, DDPCU, 22" shoes.

1—D-8 Caterpillar Tractor IH Series, 22" shoes, hydraulic bulldozer & D.D.P.C.U. New set tread pins & bushings. Also new set sleeves, pistons, pins, rods, main bearings.

Check on what you may require.

EUGENE P. READING, INC.
Walnut St. & B. & O. R.R.
Roselle, New Jersey
P. O. Box No. 67
Chestnut 5-0200—New Jersey

SUMMER BARGAINS

TELSMITH No. 36 Gyrasphere with new liners and bevel gears, Srl. No. 6006 ..... $4950

UNIVERSAL 15 x 36 Jaw Crusher, Srl. No. 5828 ..... $2495

SYMONS 3' Fine Cone Crusher, Srl. No. 342 ..... $6950

ORE BIN, Douglas Fir (new), 14' dia. x 24' staves, capacity 558 bbls. Good for aggregate $995

MERRICK Feedoweight feeder for 20" belt, capacity 10-30 T. per hour (new) $1695

DINGS Magnetic Pulley, 24" dia., 18" belt $1245

SMITH 56S Tilting Drum Concrete Mixer, Srl. No. 51550, with 40 HP electric motor.. $5450

SMITH 112S, 4 CY. Tilting Drum Concrete Mixer, Model 422, on steel skids and with 75 HP, 1160 RPM motor, 440 3/60 ..... $6950

COAST EQUIPMENT COMPANY
444 Eighth St., San Francisco 1 MArket 1-5740

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CLASSIFIED ADVERTISING IN CONCRETE PRODUCTS SECTION

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18" x 36" Jaw, Traylor.
No. 5448 Raymond Mill.
5-roll 50" Raymond, high side.
48" Symons, vert. disc.
Size 1, Allis-Chalmers.
36" x 24" Jeffrey Hammer.

KILNS—COOLERS—DRYERS

9' x 80' x 5/8".
7' x 160' x 5/8" (2).
7' x 120' x 5/8" (2).
310-16 Roto-Louvre.
5' x 67' x 5/16".
5' x 30' x 3/8" Ruggles-Cole.
4'6" x 50' x 1/4" with lifters.
4'6" x 40' x 3/8" Traylor.
4' x 35' x 1/2" with burner.

MILLS

23" x 12' Pug, double shaft, L.B.
4' x 20' Paddle, double shaft.
5' x 22' Tube, Smidth.
6' x 8' Abbe, ball.

MISCELLANEOUS

Classifier, Dorr, Type DSFH.
Conveyor, Apron, 34' cc., 36".
Conveyors, Belt. All sizes.
Elevators, Bucket. All sizes.
Magnetic Belts, 30" x 7'5" CC.
Screen, Vibrating, 4' x 7'.

Write for Our Catalog

HEAT & POWER CO., INC.
70 PINE ST., NEW YORK 5
Hanover 2-4890
Machinery & Equipment Merchants

CLASSIFIERS: 4—Akins 54"x34' and 4—Wemco 78"x28½', Simplex, double pitch, weir type, with 220/440 volt syncrogear motor and lifting device. Four located in Nevada. NEW condition.

SINK FLOAT MILL: Wemco Sink Float Mobile Mill, capacity 360 tons per day, condition like new.

PORTABLE CRUSHING PLANT: Cedar Rapids 2 unit Plant, 40 tons per hour, used only four months.

CRUSHERS: 1 — 16" Superior McCully with 125 HP motor and V-belt drive. 1—Allis Chalmers, all steel, type R548, with 125 HP motor and V-belt drive.

PULVERIZERS: Hardinge steel lined conical Ball Mills complete with motors and auxiliary equipment for dry grinding, sizes 5'x22", 10'x36", and 10'x48".

LOCOMOTIVE CRANE: 25 ton capacity, thoroughly modern, gasoline powered, cast steel trucks, air brakes, with or without 1¼ yd. clam shell bucket. For sale or rent. Located Minnesota.

MINE HOISTS: Single and double drum 100 to 1500 H.P. with all electrical equipment. Complete specifications, drawings and photos available.

DIESEL MOTOR: Caterpillar D13000 portable on skids, 122 H.P.

PORTABLE BELT CONVEYOR: Barber Greene, 24" belt, 50 ft. long, gasoline motor, NEW condition.

WE BUY AND SELL EQUIPMENT THROUGHOUT NORTH AND CENTRAL AMERICA

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300—3-8301

FOR VALUES — BUY BRILL

3—Vulcan 8' x 125' x ¾" Rotary Kilns.
2—Reeves 7' x 160' x ⅝" Rotary Kilns.
2—Reeves 7' x 120' x ⅝" Rotary Kilns.
2—Allis Chalmers 9' x 80' x ⅝" Rotary Kilns.
1—Vulcan 8' x 80' x ⅝" Rotary Kiln.
1—Allis Chalmers 6' x 60' x ½" Rotary Kiln.
2—F. L. Smidth 4' x 30', 4' x 25' x ½" Rotary Kilns.
1—Vulcan 5'6" x 25' x ½" Rotary Kiln.
1—Ruggles Cole 6' x 50' x ⅜" Rotary Dryer.
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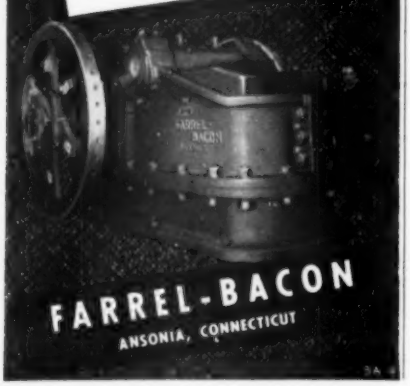

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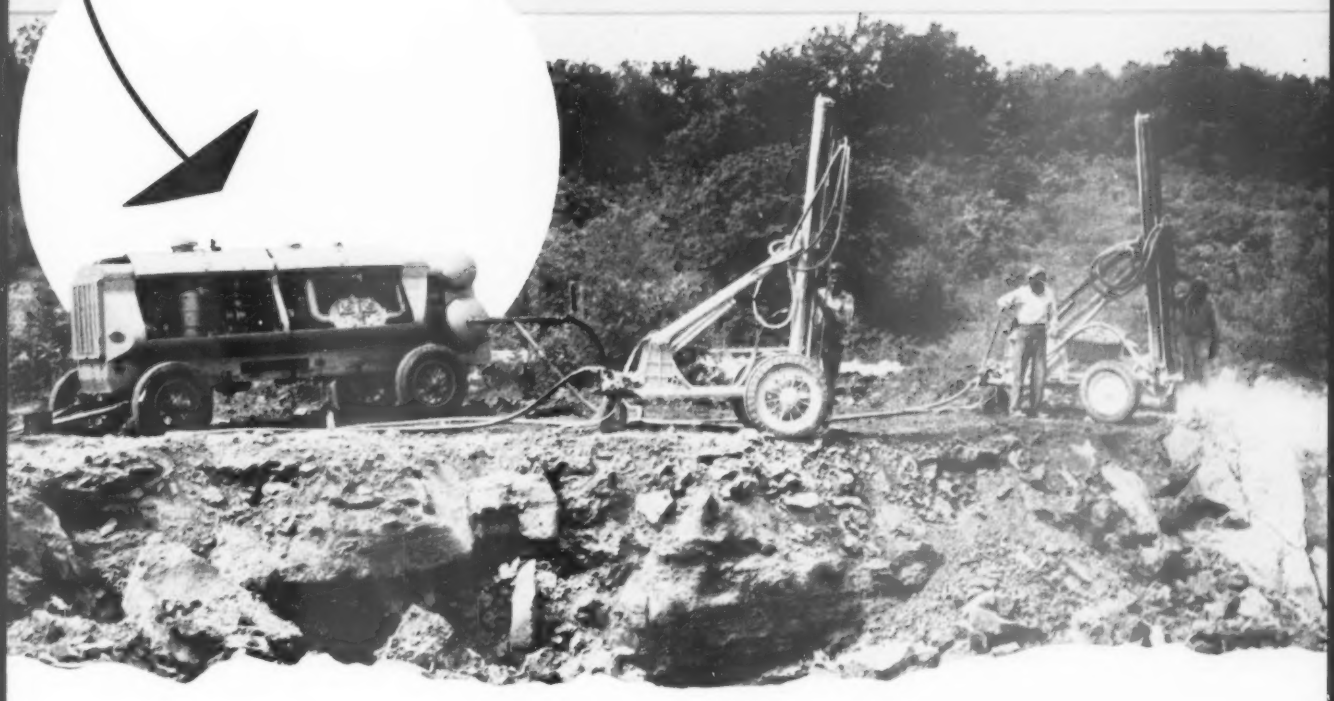
One of seven good reasons why the foreman says, "They're tops!"



Each of the seven Caterpillar machines on the job at Franklin Limestone Co.'s quarry at Old Hickory, Tenn., is one of the reasons the foreman says, "They're tops." A Caterpillar D13000 Diesel Engine is in this Gardner-Denver compressor. Four more D13000s, running eight hours a day, drive the primary, secondary and return crushers and the roll mill in the big Cedarapids crushing plant. A Cat* D13000 Electric Set supplies electric current and a Caterpillar HT4 Shovel stockpiles and loads trucks. Daily output is 900 tons of road rock and 100 tons of agricultural limestone.

All Caterpillar Diesels are foul-free, even when idling, on low-cost No. 2 furnace oil. They save money for you three ways: reduced engine maintenance, cheap fuel, and less of it.

Efficient seals and filters give positive protection against severe abrasive dust. This lengthens engine life, cuts down on oil changes. James E. Hensley, foreman at Old Hickory, is an experienced quarryman. He says, "I think Caterpillar products are tops. I've used them before, down in Cuba. They can't be beat."

All these are obvious reasons why this quarry standardized on Caterpillar power. But there is an added payoff: operator familiarity and ease of maintenance. *Plus* fast, skilled service—anywhere, any time—from your well-stocked Caterpillar Dealer. Ask him to show you any one of the honestly rated engines or electric sets—to 500 HP or 315 KW—that will do most to increase *your* profits. Then specify Caterpillar power next time you order your equipment from a leading dealer.

Caterpillar Tractor Co., Peoria, Illinois.

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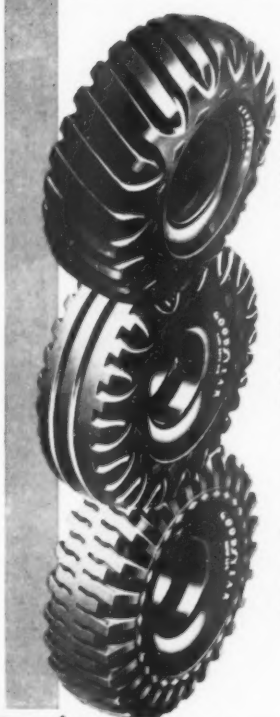

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